Flood Mitigation Plan

November 2001

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Flood Mitigation Plan

Introduction

In 1998, the City of Rye was designated a Project Impact community by the Federal Emergency Management Agency (FEMA) and was awarded a grant to improve its disaster-resistance through appropriate studies, and public and private sector partnerships. In its award, FEMA stressed the need for the City to reduce repetitive property loss due to flooding. The City's Project Impact goals include preparing a Flood Mitigation Plan, participating in related FEMA programs, and completing a comprehensive watershed study to yield updated flood insurance rate maps and related planning information.

The City of Rye Flood Mitigation Plan is based on City documents that reflect current policies and technical information; it follows general guidance for mitigation plan development recommended by the Federal Emergency Management Agency (FEMA). The Plan also considers related federal, state and county initiatives.[1] By adopting a Flood Mitigation Plan, the City becomes eligible for funding to reduce or eliminate the risk of repetitive flood loss through FEMA's Flood Mitigation Assistance Program. The Flood Mitigation Plan also qualifies the City to receive credit through the FEMA Community Rating System program (CRS) to lower insurance rates for residents who purchase flood insurance from the federal program. Participation in the CRS program is an important element of Rye's Project Impact.

When completed, the Project Impact Technical Study, now underway, will provide updated baseline watershed data for flood mitigation planning. This information will be used to expand and amend the City's Flood Mitigation Plan.

1.0 Background

1.1 Community Description

The City of Rye is located in Westchester County, New York, approximately 7 miles north of the New York City line. It is bounded on the south and east by Long Island Sound, on the west by the Village of Mamaroneck, on the north by the Village of Rye Brook, to the northwest by the Town/Village of Harrison, and on the northeast by the Village of Port Chester. The City shares three watersheds with these other communities: Blind Brook, Beaver Swamp Brook, and coastal Long Island Sound.

Rye is a small residential community of approximately 15,000 people,[2] with single-family homes occupying 60 percent of its 6 square miles. Less than 10 percent of the City is in commercial use: Campus-type office buildings that are headquarters for businesses and corporations are the main large economic enterprises in the community; the central business district consists of about 200 small businesses that serve local residents.

[1] The local plans and documents used to prepare this Plan, and the county, state and federal plans and programs also considered are discussed in sections 1.4, 1.5, 1.6 and 1.7.
[2] 14,955 residents according to the 2000 census.

As a result of its position on the coast and at the base of two watersheds, Rye experiences chronic flooding and wind damage from coastal and inland storms. Flooding causes repetitive property losses in several locations throughout the City; as a result, approximately 500 residents hold federal flood insurance policies.

The City of Rye has a 35-year history of working to control flooding within its community, on its own and in cooperation with neighboring municipalities. Past efforts include participating in federal watershed-wide flood control initiatives and intermunicipal stormwater planning partnerships, sharing and individually funding structural controls, and adopting surface water management and land use regulations to minimize the impact of flooding. In 1998, the City was designated a Project Impact community by the Federal Emergency Management Agency; the purpose of Project Impact is to build disaster-resistant communities through private and public sector partnerships. As part of Project Impact, the City is working closely with the New York State Emergency Management Office, the Westchester County Emergency Management Office and Chamber of Commerce, and major private corporations to improve its disaster preparedness. In 1999, the City retained consultant services to comprehensively model, delineate, and assess flood elevations and impacts within the community; the resultant technical plan, to be completed in 2001, will provide the watershed database necessary to identify and implement the structural and institutional measures outlined in this plan, as well as new initiatives.

1.2 Watershed Components

With few exceptions, the City of Rye shares its watersheds with other municipalities, many of whom occupy the upper reaches and thereby control stormwater flows to Rye. The City is situated on Long Island Sound and includes portions of four coastal sub-basins: Port Chester Harbor, Long Island Sound, Milton Harbor and Mamaroneck Harbor. The City also occupies the lower reaches of the Blind Brook and Beaver Swamp Brook watersheds; both basins are tributary to Long Island Sound. The Port Chester Harbor Sub-basin is shared with the Village of Port Chester and the Town of Greenwich, Connecticut. The Long Island Sound and Milton Harbor sub-basins are entirely within the City limits. The Mamaroneck Harbor Sub-basin contains parts of the City of Rye and the Village of Mamaroneck. The Blind Brook Watershed contains portions of the City of Rye, the Village of Rye Brook, the Town/Village of Harrison, the City of White Plains and the Village of Port Chester. In addition to Rye, the Beaver Swamp Brook Watershed contains portions of the Town/Village of Harrison and the Village of Mamaroneck; the west branch of the Beaver Swamp Brook is entirely within the Town/Village of Harrison and is known as Brentwood Brook or Beaver Swamp Brook West (Figure 1.1).

Rye is located in the Hudson Valley climatological division in New York State. The average annual rainfall is 49 inches.[3]

1.2.1 Blind Brook Watershed

Blind Brook drains an area of 10.91 square miles (6,983 acres). It originates as two branches well north of the City, at the Westchester County Airport in the Town of

[3] Federal Emergency Management Agency Federal Insurance Administration. 1979. Flood Insurance Study, City of Rye, New York, Westchester County.

City of Rye Flood Mitigation Plan

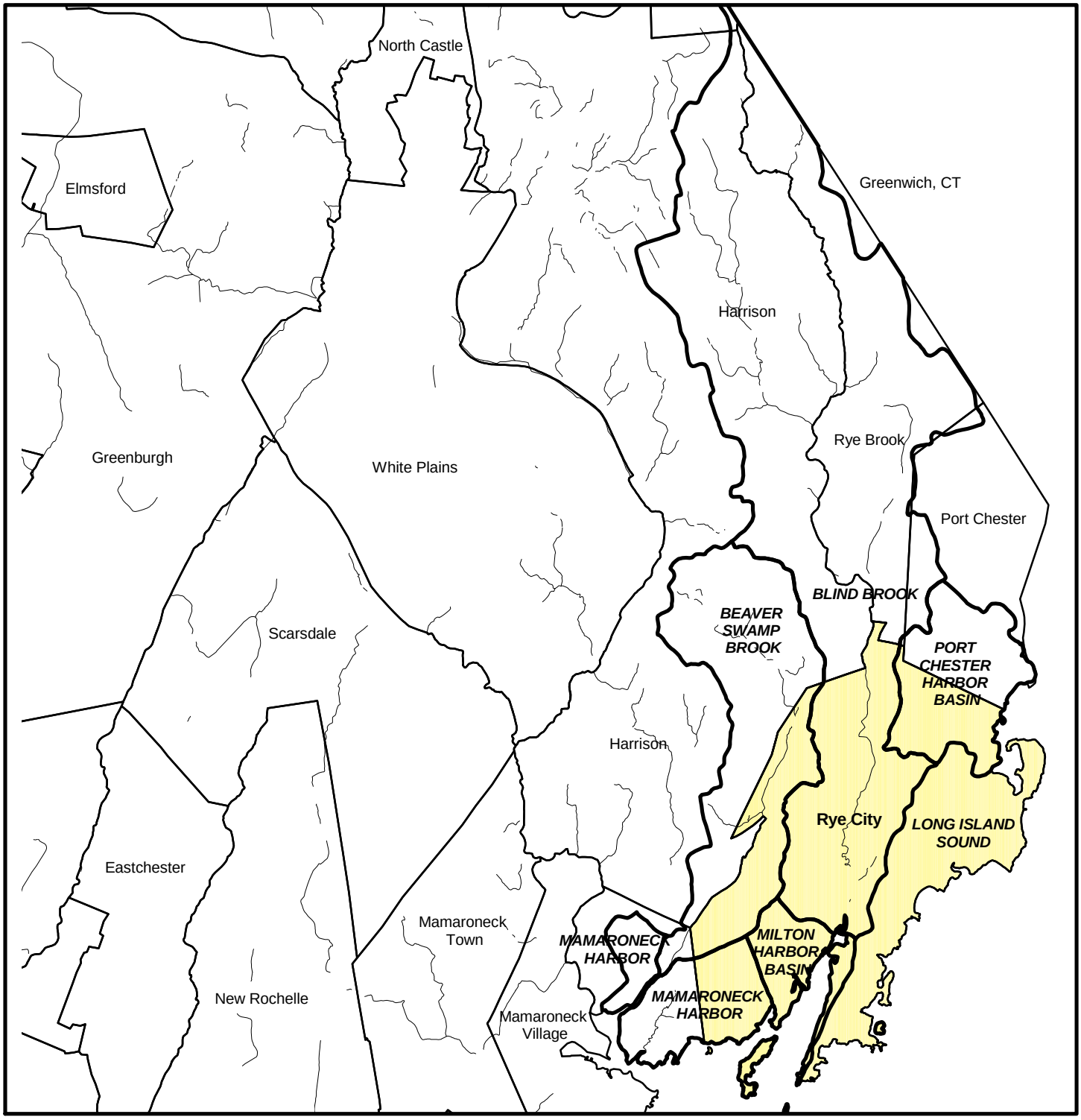

Figure 1.1:

Watershed and Drainage Basins

Municipal Boundary
Drainage Basins
Streams

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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

Harrison. As of the fall 2001, all of the airport runways drain to the brook.[4] The two branches flow south to a confluence at the Hutchinson River Parkway. A second tributary to the east joins the main branch south of the Bowman Avenue Dam in the Village of Rye Brook. From the dam, the brook flows south, under the New England Thruway and through the City business district to Milton Harbor.

Principal land uses in the upper Blind Brook Watershed within the Town of Harrison and the Village of Rye Brook are the airport, large campus offices, educational and religious institutions, golf courses, residential areas and significant wetlands. Within the City, the watershed is dominated by low and medium density residential development, institutional and recreational uses, open space, and a small central business district; areas along the brook are highly developed, with many residences, businesses and public buildings adjacent to the watercourse. State-protected tidal wetlands and other federally and locally jurisdictional wetlands also occupy the lower watershed.

1.2.2 Port Chester Harbor Sub-basin

The Port Chester Harbor Sub-basin drains an area of approximately 1.3 square miles (848 acres), less than a third of which is occupied by the northeast corner of Rye.[5] The portion of Rye within this sub-basin is approximately bounded on the west by the Boston Post Road, on the north by the Rye City/Port Chester corporate line, on the east by Port Chester Harbor and on the south by Grace Church Street and Kirby Lane. Land uses include major highways and arterial streets, low-density residential areas (1-2 dwelling units/acre), medium density residential areas (8-14 du's/acre), and office space.

1.2.3 Long Island Sound Coastal Sub-basin

The Long Island Sound Coastal Sub-basin drains an area of approximately 1.7 square miles (1,067 acres), all within the City limits.[6] This sub-basin extends inland to Stuyvesant Avenue and west of Forest Avenue but not quite to Midland Avenue; on the north it is bounded by Grace Church Street and Kirby Lane, on the east and south by Long Island Sound. Land uses are predominantly low and medium density residential areas, parks and recreation lands, waterfront recreation and development areas (e.g. beach clubs), and natural open space.

1.2.4 Milton Harbor Sub-basin

The Milton Harbor Sub-basin drains an area of 0.43 square miles (272 acres), all within the City of Rye.[7] This sub-basin is bounded on the west by the Boston Post Road and Marshlands Conservancy; on the north by Soundview, Helen and Hewlett avenues; on the east by Milton Road and Stuyvesant Avenue; and on the south by Long Island Sound. Dominant land uses within this sub-basin include the City-owned boat basin and golf course, low and medium density residential areas, and natural open space.

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[4] As part of the Airport Master Plan development, Westchester County diverted an additional 80 acres of drainage from the Rye Lake water supply to Blind Brook. By fall 2001, all runways will drain to the Blind Brook system. As mitigation, the County has constructed several detention basins on airport property designed to manage the 100-year storm event.

[5] "Controlling NPS Pollution in Long Island Sound: A Management Plan." 1998. Watershed Advisory Committee 3 and Westchester County Planning Department.

[6] Ibid.

[7] Ibid.

1.2.5 Beaver Swamp Brook Watershed

Beaver Swamp Brook drains approximately 4.83 square miles or 3,092 acres (4.7 sm. at the USGS Short Street gauge); its two main branches originate north of Rye in the Town of Harrison. The headwaters of the Beaver Swamp Brook branch, which drains approximately 3.3 square miles, are in a wetland complex north of Polly Park Road; from there, the brook flows south through the Westchester and Willow Ridge country clubs and golf courses, and enters the City of Rye north of Locust Avenue. It continues south through the Greenwood Union Cemetery, under the New England Thruway, and through city-owned "Parcels A and B," a wildlife preserve and New York State-designated wetland. South of Theodore Fremd Avenue, the brook runs through corporate office parks, residential neighborhoods, and three NYS-designated wetlands, to its confluence with Brentwood Brook at the Rye Neck High School. Immediately downstream from the confluence, the brook enters a residential area in the Village of Mamaroneck, flows south under US Route 1 and a distance of 0.5 miles into the tidal wetland complex, Guion Creek, and Mamaroneck Harbor.

Brentwood Brook is tributary to Beaver Swamp Brook and drains approximately 1.5 square miles (960 acres). It is entirely within the Town/Village of Harrison and rises as two arms north of Stratford and Woodlands roads in the Town of Harrison; the two flow south and converge at the high school north of the New England Thruway. Brentwood Brook continues south through densely residential neighborhoods to its confluence with Beaver Swamp Brook at the Rye Neck High School just north of the US Geological Survey's Short Street gauge.

The upper watershed contains low-density residential neighborhoods, golf course/country clubs, corporate office parks and institutional facilities. The lower watershed is more densely developed, particularly within the Town of Harrison, and includes ¼-acre or smaller residential lots, commercial and industrial areas. Much of the 100-year floodplain has been developed in the lower reaches of both branches and many buildings are within several feet of the brooks.

1.2.6 Mamaroneck Harbor Sub-basin

The portion of the Mamaroneck Harbor Sub-basin located within the City of Rye drains an area of approximately .43 square miles (275 acres) and is bounded on the west by the Mamaroneck/Rye City corporate line, on the north by the Boston Post Road, on the east by the County-owned Marshlands Conservancy, and on the south and east by Long Island Sound. Dominant land uses within this sub-basin include low-density residential areas and natural open space.

1.3 Principal Flooding Problems

1.3.1 Blind Brook, Port Chester Harbor, Milton Harbor, and Coastal Long Island Sound

The coastal sections of Rye flood during unusually high tides associated with major storms and hurricanes; large-scale flooding has occurred on numerous occasions, most notably in 1938, 1944, 1955, 1962, 1972, 1975, 1977, 1979, 1992, and as recently as September 1999. Interior portions of the Blind Brook watershed also flooded at these times. Hurricane Agnes (June 1972; approximate frequency 60 years)

produced the highest flow ever recorded at the Blind Brook gauge,[8] and the 1975 storm discharge was only slightly lower. These storms extensively damaged properties and public infrastructure, but no lives were lost.

Flooding on Blind Brook is caused by narrow channel width, obstructed flow, sediment-constricted bridge openings, historical wetland filling and floodplain encroachment, and in the lower reaches, tidal backwater effects (tidal influence extends upstream to Central Avenue). The principal areas within the City that experience significant repeated flooding include all of the coastal locations, i.e., sections of Kirby Lane, Manursing Island, Pine Island, and the Rye Road-Greenhaven Road-Lake Road section of Greenhaven; Indian Village; Loewen Court and vicinity; and properties in the vicinity of Playland Parkway, from Pine Lane south to Milton Harbor. During severe events, Manursing Island, Kirby Lane south, Pine Island and Hen Island are inaccessible.

1.3.2 Beaver Swamp Brook and Mamaroneck Harbor

Beaver Swamp Brook caused significant flooding during the same storm events that affected Blind Brook. The USGS gauge at Short Street recorded the highest flow of its history during the 1975 storm.[9]

Significant flooding occurs along the brook in the City of Rye from Belmont Avenue south to Bradford Avenue and Hunt Place, and in the Town/Village of Harrison upstream of Broad Street. Significant flooding also occurs in the Town/Village of Harrison along Brentwood Brook on portions of the Harrison High School upstream of I-95 and between Union and Harrison avenues.

Flooding along Beaver Swamp and Brentwood brooks occurs because of low-lying adjacent lands and floodplain development. In some areas, such as Park Avenue, flooding is exacerbated by silted bridge openings and backwater effects; however, these constrictions reduce the flood potential for downstream properties. Five significant obstructions to flow were identified in a 1986 stormwater management study of the brooks: North Street bridge over Beaver Swamp Brook; Penn Central Railroad bridge over Beaver Swamp Brook; Park Avenue over Beaver Swamp Brook; floodplain construction on Beaver Swamp Brook just north of the confluence with Brentwood Brook; and the Penn Central Railroad over Brentwood Brook[10] (Figure 1.2).

1.4 History of Flood Control Initiatives

Significant portions of Rye's Long Island Sound and Milton Harbor coastlines, and of the Blind Brook and Beaver Swamp Brook watersheds, are within the 100-year floodplain as defined by the Federal Emergency Management Agency's Flood Insurance Rate maps. Because the City is located at the bottom of these watersheds and is vulnerable to tidal impacts, it has long been concerned with mitigating the potential for flooding. Portions of the City subject to coastal flooding include undeveloped areas (e.g., the coastal sections of the County's Marshlands Conservancy and Playland Nature Preserve), waterfront uses such as private and public beach clubs,

[8] The gauge was dismantled in 1996 under County budget cuts; therefore, records are not available for 1996 and successive years.
[9] Ibid.
[10] Satterthwaite Associates Inc., 1986. Comprehensive Stormwater Management Plan for Beaver Swamp Brook Watershed, Westchester County, NY. 71pp. plus appendices.

City of Rye Flood Mitigation Plan

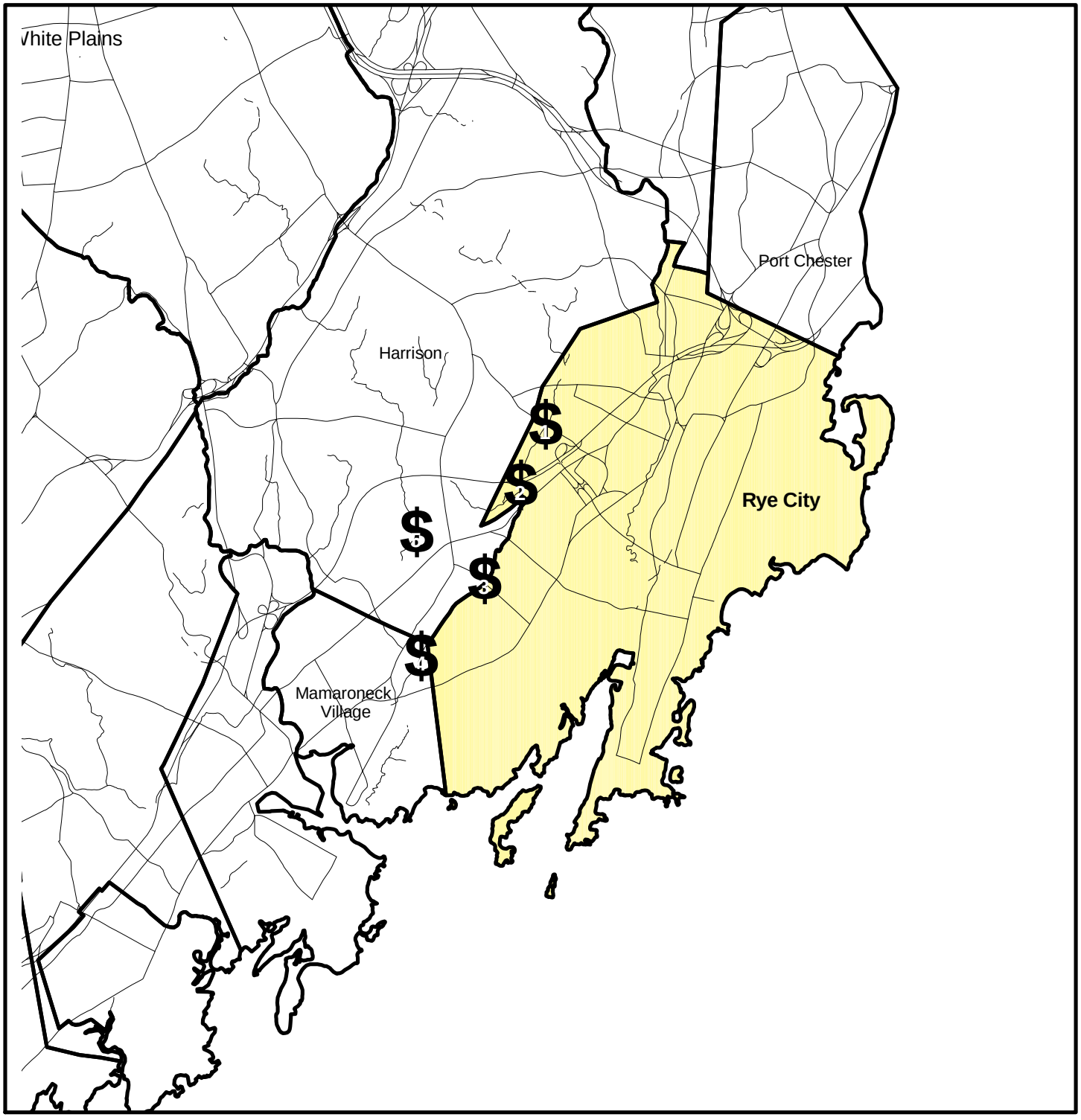

Figure 1.2:

Significant Stormwater Flow Obstructions

Streams
Municipal Boundary
Major Roads

OBSTURCTIONS:
1. North Street Bridge over Beaver Swamp Brook
2. Penn Central Railroad Bridge over Beaver Swamp Brook
3. Park Avenue over Beaver Swamp Brook
4. Floodplain Construction over Beaver Swamp Brook
5. Penn Central Railroad over Brentwood Brook

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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

the City marina, and residential neighborhoods. Residential, institutional and commercial land uses throughout the City are subject to interior flooding. Since the early 1960's, in an effort to mitigate flooding, Rye has acquired lands for flood control, funded structural mitigation projects, participated in federal flood control programs and initiatives, shared the cost of developing intermunicipal stormwater management plans, and enacted local laws to control surface water.

1.4.1 Land Acquisition and Structural Controls (City-funded)

The City first noted the importance of protecting floodplains in its 1963 Development Plan and began to acquire land for flood control and conservation purposes along both the Blind and Beaver Swamp brooks. Blind Brook was dredged and a dam and reservoir built at the Bowman Dam site, a City-owned parcel in the upstream Village of Rye Brook. As part of the Technical Study now being prepared for Project Impact, the City is studying modifications to the Bowman Dam to increase its flood control capability, and is identifying key flood mitigation parcels for acquisition.

1.4.2 Federal Flood Control Initiatives

In the early 1960's, the Blind Brook Watershed was evaluated as part of the US Army Corps of Engineers flood control program but failed the cost-benefit requirements for federal flood control projects. In 1967, the Westchester County Soil and Water Conservation District (SWCD) was created by the County Board of Legislators to pursue a USDA Soil Conservation Service[11] Public Law 83-566 Small Watershed Protection Plan for Blind Brook. Under PL-566, the federal government provides funds for major structural flood controls; the City of Rye entered into a formal agreement with the USDA and the County SWCD to form a watershed protection district to underwrite related project costs, including land acquisition and administration.

The Blind Brook PL-566 project proposed two dams to create regional stormwater detention facilities in the upper portion of the watershed, one on property owned by the State University of New York at Purchase, the other on private land in the Town of Harrison. The project also proposed building dikes in the vicinity of Loewen Court and modifying the Oakland Beach Avenue bridge in the City of Rye. The estimated 1977 project cost was $3.7 million for design and construction, relocation payments, and a percentage of ongoing district administration. Due to litigation by the owner of one of the dam sites, the PL-566 initiative failed and was formally deactivated by its sponsors in the early 1990's.

1.4.3 Participation in the National Flood Insurance Program

In 1978, the City qualified for the National Flood Insurance Program by adopting floodplain zoning which exceeds the requirements of the federal Flood Insurance Administration. As part of the Technical Study now being prepared for Project Impact, the City is updating its flood insurance maps to reflect changes in the watershed since the original maps were filed in 1984.

[11] Now the USDA Natural Resources Conservation Service.

1.4.4 Intermunicipal Planning Initiatives

In 1984, at the request of the City of Rye, Town/Village of Harrison and Village of Mamaroneck, the Westchester County Soil and Water Conservation District retained a consultant to prepare a comprehensive stormwater management plan for Beaver Swamp Brook. [12] The work was conducted under the guidance of the Beaver Swamp Brook Watershed Advisory Committee, which consisted of elected officials and staff members from each of the three municipalities and the District.

The Beaver Swamp Brook study developed a hydrologic simulation model and a watershed database that included existing land use (1985), future land use (build-out under zoning), hydrologic soil groups, land surface slopes, and watershed and subarea delineations. The results were used to develop stormwater control alternatives that included a detention facility upstream of I-95 on Brentwood Brook, a detention facility upstream of North Street on Beaver Swamp Brook (now known as "The Ives") and, of much less benefit, a revised hydraulic structure for the railroad crossing on Brentwood Brook. With the exception of a modified extended dry basin constructed at "The Ives," none of the proposed improvements was implemented, either due to cost or insubstantial benefit[13]. However, the three municipalities and the District shared the cost of an additional automated flow/precipitation gauge in the mid-portion of the basin[14], and the City has been using the Beaver Swamp Brook hydrologic simulation model to determine detention requirements for new development proposals within the watershed.

1.4.5 Institutional Controls

Over the past three decades, Rye has been among the first in the County to commit to flood control in its comprehensive plan, to enact local laws governing surface water, and to modify existing codes to strengthen stormwater management in land use planning and development. With the exception of the 1991 Local Waterfront Revitalization Program, these measures apply citywide.

1985 Development Plan

The City's land use decisions currently are guided by the 1985 Development Plan (now being updated) and the 1991 Local Waterfront Revitalization Plan. The Development Plan calls for both non-structural and structural flood controls. Non-structural goals include encouraging property owners to flood-proof existing buildings, monitoring upstream development for its potential to cause flooding, acquiring floodplain lands for flood control and conservation uses, lobbying for state and federal funding, adopting flexible development regulations to discourage construction in the floodway, and improving the City's flood warning system by installing automated flood gauges throughout the community. Structural solutions include ongoing public works

[12] Satterthwaite Associates Inc., 1986. Comprehensive Stormwater Management Plan for Beaver Swamp Brook Watershed, Westchester County, NY. 71pp. plus appendices.

[13] The estimated costs associated with the detention facilities proposed in the Satterthwaite report were $300,000 for the Beaver Swamp Brook basin and $450,000 for the Brentwood Brook basin in 1986 dollars.

[14] The County dismantled the gauge as part of budget cuts in 1996.

maintenance (e.g., dredging of bridge openings), improving the Bowman Avenue dam, and dredging Blind Brook and Milton Harbor to facilitate stormwater runoff.[15]

1991 Local Waterfront Revitalization Plan

In 1991, the New York State Department of State approved the City's Local Waterfront Revitalization Plan (LWRP) pursuant to the Waterfront Revitalization of Coastal Areas and Inland Waterways Act. The plan defines a Local Waterfront Revitalization Area that extends approximately from Boston Post Road east and south to Long Island Sound (Figure 1.3). Land use actions within this area must be consistent with waterfront revitalization policies that govern land development, natural resources, recreation and public access, historic and scenic resources, energy management, and erosion and flooding. The City's LWRP promotes water resource protection and flood mitigation at policies 2, 11, 12, 13, 14, 16, 37 and 44.

Policy 2 gives preference to water-dependent uses and facilities on or adjacent to coastal waters. Policy 2 further limits specific waterfront properties to permitted main uses such as membership clubs (beach, yacht and similar water-related and water-enhanced clubs). Single detached residences, while allowed, are subject to additional standards and requirements, including the need to "preserve all wetlands and floodplains."

Policy 11 applies to areas designated "Flood Hazard" and "Coastal High Hazard" under the National Flood Insurance Program administered by the Federal Emergency Management Agency. It also applies to areas designated as "Erosion Hazard" under the Coastal Erosion Hazard Management Program administered by the New York State Department of Environmental Conservation. Policy 11 requires that buildings and other structures sited in the coastal area minimize damage to property and prevent flooding and erosion that might endanger human lives.

Policy 12 protects natural storm buffers in the coastal zone, including beaches, to minimize property damage from flooding and erosion. **Policy 13** requires that erosion protection structures have a reasonable probability of controlling erosion for at least 30 years from the time they are built. **Policy 14** requires that activities and development, including the construction of erosion control structures, create "no measurable increase in erosion or flooding" at the site or other locations. **Policy 16** requires that public funds be used only for erosion protection structures necessary to protect human life, or for which the public benefits outweigh the long-term monetary and other costs, including the potential to increase erosion and adverse effects on natural protective features.

Policy 37 requires best management practices to minimize discharging eroded soils into coastal waters, and preparation of a surface water control plan for any activity within the coastal zone that alters the flow of stormwater. Policy 37 also calls for 100-year detention on sites of 4 or more acres, or sites with a proposed 75% or more net increase in impervious surface. Sites under these thresholds must provide 25-year detention. Policy 37 also precludes filling in natural watercourses or constructed channels.

[15] The 1985 Development Plan also proposed adding floodgates to the Oakland Beach Bridge; this option since has been determined to be infeasible.

City of Rye Flood Mitigation Plan

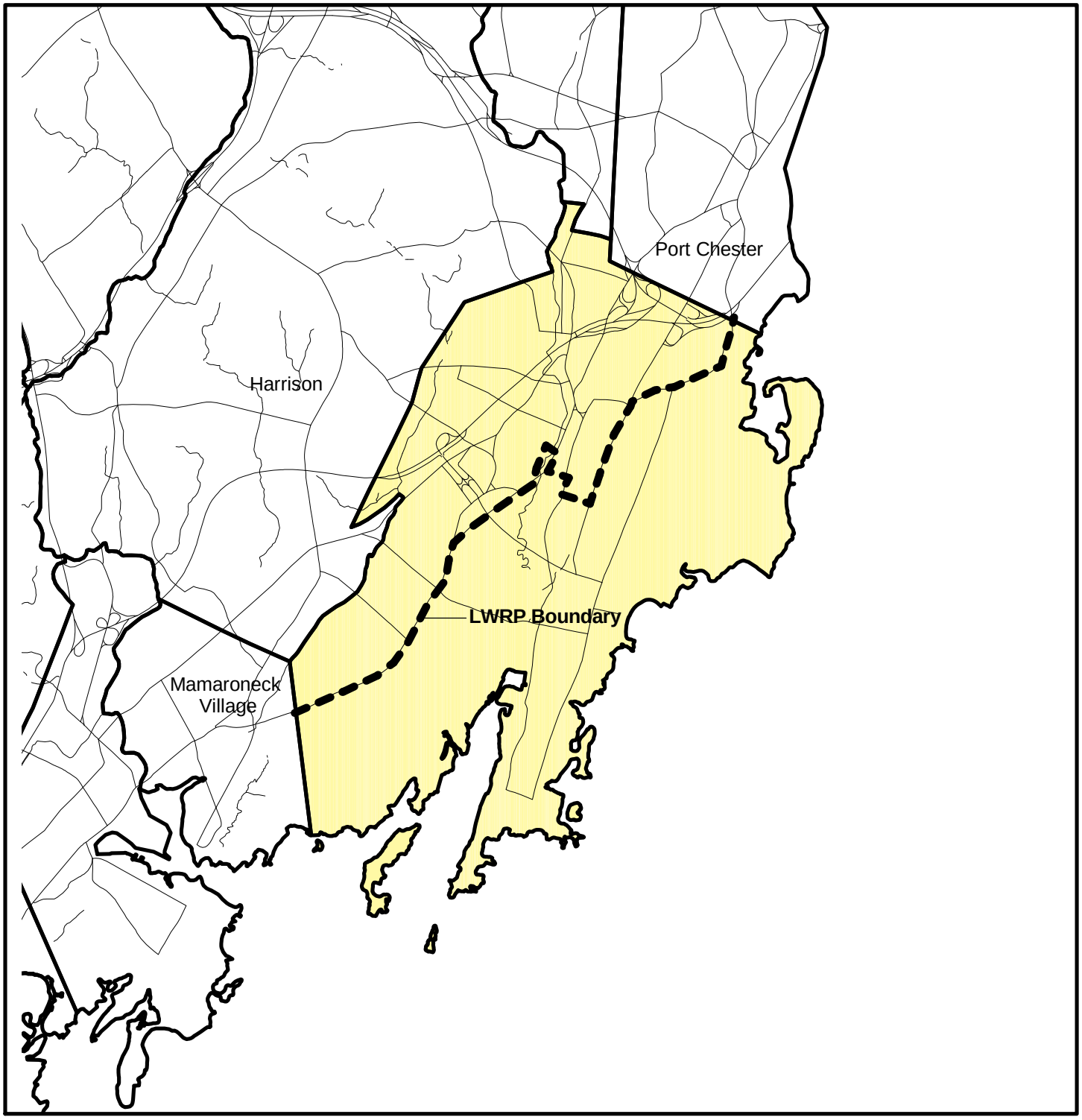

Figure 1.3:

Local Waterfront Revitalization Program (LWRP)

Streams
Municipal Boundary
Major Roads

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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

Policy 44 commits to preserve and protect tidal and freshwater wetlands and their benefits, including erosion, flood and storm control.

The City has implemented its LWRP policies by amending its Code to add Chapter 73, Coastal Zone Management (Local Law No. 1991). Chapter 73 requires a finding of consistency with the policies of the LWRP for actions taken in the coastal zone. The City also has amended all related local laws to implement the LWRP policies designed to mitigate flooding.

City Hurricane/Coastal Storm Emergency Response Plan

In 1997, the Rye City Council approved a storm emergency response plan to govern city actions in the event of a hurricane or coastal storm threat. The plan, prepared in cooperation with the New York State Emergency Management Office and the Westchester County Office of Disaster and Emergency Services, outlines three phases of coastal storm emergency response (preliminary, partial and full) and details activities that will be coordinated by the City Emergency Operations Center. The plan also identifies functional areas and the individual or agency responsible for ensuring their operation; critical functions include the EOC, communications, intergovernmental liaisons, emergency declarations and orders, public information, evacuation, sheltering, protective measures, emergency medical care, special needs and facilities, equipment, utility services, food, damage assessment, debris removal, and crisis counseling. The plan also lists all City, County, and State agencies that play essential roles in implementing storm emergency response, and summarizes their responsibilities.

Forest Avenue is identified in the plan as the key evacuation route, access to which must be maintained during a coastal storm emergency.

Local Legislation to Mitigate Flooding and Protect Surface Waters

In addition to the 1985 Development Plan and the 1991 LWRP, the City of Rye has enacted a significant number of local laws to manage stormwater and erosion and thereby mitigate flooding. Increasingly, as public awareness of water quality issues has grown, the City has modified its codes to incorporate those issues.

Local laws governing flood and erosion control and surface water management include:

- Chapter 170, Subdivision of Land: Specifies site plan approval procedures and requirements for any proposed development or land use change that must be submitted to the Planning Commission; all actions must be consistent with drainage and erosion control standards. The Commission may condition actions involving surface water control improvements after review by the County Soil and Water Conservation District.

- Chapter 87, Environmental Quality Review: Under procedures in the State Environmental Quality Review law, provides for environmental review of actions that may significantly affect the environment.

- Chapter 195, Wetlands and Watercourses: Requires Planning Commission approval for actions affecting wetlands and watercourses within the City. The City's ordinance is one of the most protective in New York State, representing a significant commitment to protecting wetlands for both flood control and water quality purposes.

- Chapter 173, Surface Water, Erosion and Sediment Control: Requires a City permit to grade, excavate, construct, remove vegetation, or alter the flow of surface water. This chapter includes stormwater management and storage requirements and erosion and sediment controls. Enacted in 1975, it requires detention of the 100-year storm event for any development proposing more than 75% impervious surface site coverage, and prescribes maximum discharge rates for the 100- and 25-year storms. This ordinance has resulted in the construction of 11 stormwater management detention basins throughout the city (8 dry; 3 wet). Section 173-5 requires that new construction, excluding building additions, accessory buildings, and surfaces and structures for existing buildings, be referred to the Westchester County Soil and Water Conservation District for comment.

- Chapter 197-7, Site Development: Includes erosion and sediment control regulations to prevent flooding and protect fish and wildlife habitats.

- Chapter 92, Filling and Dredging Regulations: Requires Planning Commission approval to fill or dredge in any wetland or watercourse.

- Chapter 100, Floodplain Management: Sets standards for construction in floodplains to minimize property damage and threat to human life, and requires a permit to locate, extend, convert, structurally alter or develop a building, manufactured home, structure or land located in an area of special flood hazard. This ordinance exceeds the National Flood Insurance Administration requirements and, in 1978, qualified the City to participate in the National Flood Insurance Program.

The City of Rye also has adopted the Westchester County Best Management Practices series, which governs highway de-icing, stormwater management, and erosion and sediment control. The City also holds a Municipal Memorandum of Understanding with the Westchester County Soil and Water Conservation District for stormwater management and flood control services.

1.5 Preparation of this Plan

The City of Rye Flood Mitigation Plan applies to lands within the incorporated City limits and the City-owned Bowman Dam property in the Village of Rye Brook. It is based on an August 1997 survey of the community and citizen boards and commissions conducted by the Development Plan Update Steering Committee for the 1985 Rye City Development Plan, and on an October 14, 1998 public meeting on flooding, conducted as part of the master plan update. It also is based on past stormwater management and flood control studies prepared by and for the City of Rye, and consultation with the City Building and Engineering departments, and the County Department of Public Works. The Flood Mitigation Plan also reflects elements of the Project Impact technical study being prepared by Harza Engineering Company of Utica, New York, and will be updated at the close of that study to fully reflect its findings and recommendations.

The Flood Mitigation Plan incorporates the goals, objectives and policies of the Rye City Development Plan, the Local Waterfront Revitalization Program and Coastal Zone Management Plan, the Storm Emergency Response Plan, the Comprehensive Stormwater Management Plan for Beaver Swamp Brook Watershed, and the Westchester County Nonpoint Source Management Plan for Watershed Advisory

Committee 3. These plans were prepared in coordination with the Rye City Council, Planning Commission, Development Plan Update Task Force, Local Waterfront Revitalization Program Task Force, Engineering Department, Building Department, and Conservation Commission/Advisory Council, and were the subject of numerous public meetings for the purpose of obtaining public input.[16]

The Flood Mitigation Plan also considers the goal of water quality protection, as articulated in the preceding discussion of City laws and policies, and highlighted in the federal and state programs outlined in the next section. In addition, the City's 1985 Development Plan sets forth goals and policies governing environmental protection, flooding and coastal resources that directly and indirectly support water quality. Recommendations include maintaining open space and natural features; discouraging development in floodplains and wetlands; the use of clustering, site plan review and conservation easements to protect environmentally significant features on private developments; acquiring floodplain parcels and easements along Blind and Beaver Swamp brooks for flood control and conservation purposes; conservation measures to prevent illegal discharges in wetlands and marshes; vegetative buffers between environmentally sensitive and developed areas; and the control of stormwater runoff. The Plan also calls for preserving the Hummocks, Hen Island and the marshes on Manursing Island. The City's 1991 LWRP outlines coastal water quality goals at policies 33 (best management practices to control stormwater runoff and combined sewer overflows), 34 (discharge of waste materials into coastal waters from vessels), 35 (dredging and spoil disposal in accordance with City wetland and watercourse regulations), 37 (best management practices to minimize nonpoint source discharge of excess nutrients, organics and eroded soils into coastal waters) and 44 (wetland protection). These policies are implemented in City codes governing surface water, erosion and sediment control (Ch.173), wetlands and watercourses (Ch. 195), filling and dredging (Ch. 92), site development (Ch. 197), and subdivision of land (Ch. 170).

1.6 Relationship to Other Plans/Programs

1.6.1 Federal Initiatives

1.6.1.1 National Flood Insurance Program

The City of Rye has participated in the National Flood Insurance Administration's Flood Insurance Program since 1978. The City's floodplain zoning exceeds FIA requirements for participating in the program. In October 1979, the Federal Emergency Management Agency of the FIA issued a Flood Insurance Study for the City, followed in November 1984 by release of the Floodway Boundary and Floodway Maps and the Flood Insurance Rate Maps.

1.6.1.2 Project Impact

Begun by the Federal Emergency Management Agency (FEMA) in response to escalating insurance claims costs, Project Impact is a nationwide initiative to help communities protect themselves from natural disasters (e.g., flooding) by taking actions that reduce disruption and loss. Project Impact sets forth three requirements:

[16] The Comprehensive Plan for Beaver Swamp Brook also involved the County, the Village of Mamaroneck and the Town/Village of Harrison. The WAC 3 Plan involved the Village of Mamaroneck, Town/Village of Harrison, Village of Rye Brook, and the Village of Port Chester.

preventive actions must be decided at the local level, they must include private sector participation, and they must represent long-term investments. In 1998, the City of Rye was designated a Project Impact community by FEMA and is working closely with the New York State Emergency Management Office, the Westchester County Emergency Management Office and Chamber of Commerce, and major private corporations (including Consolidated Edison Inc.) to improve its disaster preparedness. Under Project Impact, the City has begun work on a comprehensive technical study of its watersheds to provide baseline data for its disaster preparedness goals; the technical study results will be used to amplify and update the City's Flood Mitigation Plan. In 1999, the City received an additional award from FEMA and the Environmental Systems Research Institute, Inc. (ESRI) to use Geographic Information Systems software to implement Project Impact.

1.6.1.3 Long Island Sound Study

The Blind Brook and Beaver Swamp Brook watersheds are part of the larger Long Island Sound drainage basin, which was designated an *Estuary of National Significance* in 1988 by the US Environmental Protection Agency. As a result of the designation, the Long Island Sound Study (LISS), a federal-state-public partnership begun in 1985, was reconfigured in 1988 as the LISS Management Conference. In 1994, the Management Conference issued a Comprehensive Conservation and Management Plan (CCMP) that identified seven primary areas of concern, most notably low oxygen (hypoxic) conditions, toxics, pathogen contamination, and habitat degradation. The CCMP also established 11 watershed management zones, based on natural drainage basin and political boundaries, to identify nitrogen sources and develop reduction plans; Blind Brook and Beaver Swamp Brook are within Management Zone 7.

To address the most pressing problem, low oxygen caused by nitrogen enrichment, EPA, New York and Connecticut first agreed to cap nitrogen loadings from sewage treatment plants and nonpoint sources at 1990 levels. The 1994 CCMP committed to reduce nitrogen loads further, and in 1997, the LISS issued a "Proposal for Phase III Actions for Hypoxia Management," calling for a 58.5% reduction in nitrogen over 15 years. EPA and the states adopted the Phase III Proposal in February 1998, and the LISS has developed Sound-wide total maximum daily loads (TMDL's) for nitrogen by management zone. The nitrogen reduction target for nonpoint sources is 10% for each management zone; for point sources (sewage treatment plants), the reduction target varies depending on the nonpoint component, but ranges between 60-63%.

The LISS also calls for a Sound-wide habitat restoration initiative to re-establish the ecological functions of degraded or lost wetlands, intertidal flats, riverine migratory corridors, and other ecological communities. The Study has proposed 162 projects in New York State, including the following in the City of Rye: freshwater wetland restoration along Blind Brook; tidal wetland, estuarine embayment, and freshwater wetland restoration at Westchester County's Edith G. Read Sanctuary at Playland Park; tidal wetland and intertidal flat restoration at the County's Marshlands Conservancy; and freshwater wetland restoration along Beaver Swamp Brook, specifically including the Gateside office site on Theall Road and New York State-designated wetlands J-1, J-2, J-3 and J-4 on Beaver Swamp Brook.

The primary focus of the Long Island Sound Study is water quality; however, the primary areas of concern (low oxygen, toxics, pathogens and habitat degradation) are exacerbated by inappropriate stormwater management and flooding. The City

recognizes the dual goals of flood control and water quality protection as equally important in managing its water resources.

1.6.1.4 National Pollutant Discharge Elimination Systems Program

Since the passage of the Clean Water Act, the quality of the nation's waters has improved. However, according to the 1996 National Water Quality Inventory, approximately 40% of surveyed US waterbodies did not meet water quality standards; a leading source of this continued impairment is polluted storm water runoff.

Phase I of the US EPA's storm water program was promulgated in 1990 under the Clean Water Act. Phase I relies on the National Pollutant Discharge Elimination System (NPDES) permit program to address storm water runoff from medium and large municipal separate storm sewer systems (MS4s), construction sites larger than 5 acres, and 10 categories of industrial sources.

In November 1999, EPA published the Storm Water Phase II Proposed Rule to expand the Phase I program by requiring all unregulated storm water dischargers to apply for NPDES permit coverage within approximately 3 years. The Phase II program requires permits for owners and operators of currently unregulated MS4s located in "urbanized areas," as well as for owners or operators of construction activities that disturb land areas greater than or equal to 1 acre. Small MS4s outside of urbanized areas, construction activities disturbing less than 1 acre, and non-Phase I industrial sources, can be designated for NPDES coverage on a case-by-case basis where watershed plans, TMDL analyses, or other local water quality assessments identify a need to control these sources of storm water runoff. Additional requirements could apply to the Blind Brook and Beaver Swamp Brook watersheds given their location within the Long Island Sound Study Management Zone 7 for which TMDL's have been developed.

Under Phase II, a regulated small MS4 owner or operator will need to develop and implement a storm water management program designed to reduce the discharge of pollutants from their MS4 to the "maximum extent practicable." The permit application would need to include the selection of BMPs and measurable goals for each minimum measure in the permit application.

Under Phase II, a construction activity would be governed by specific requirements developed by the State. If the Phase I general permits are used as a guide, these requirements likely would require preparation of a storm water pollution prevention plan (SWPPP).

The water quality requirements associated with the NPDES modifications, the Long Island Sound Study targets, and the need to control flooding within the City of Rye, dictate a full assessment of flood mitigation approaches to ensure that both water quality and flood control goals are met. The City's Project Impact technical study has been designed for this purpose.

1.6.2 State Initiatives

1.6.2.1 Priority Waterbodies Problem List

Pursuant to the federal Clean Water Act, the New York State Department of Environmental Conservation maintains a "Priority Waterbodies Problem List" (PWPL) of

surface waters whose designated uses are not being met or are threatened by declining water quality. Certain segments and waterbodies within the Blind Brook and Beaver Swamp Brook watersheds have been identified by the State as threatened, stressed, or impaired by nonpoint source pollution. Several reaches of Blind Brook, Mead Pond, and Milton Harbor are listed on the PWPL due to pollution from nutrients, urban runoff, and construction activities. Segments of Beaver Swamp Brook and Guion Creek also are on the list. Primary pollutants in Beaver Swamp Brook are sediment and urban runoff; in Guion Creek, they are pathogens and urban runoff.

In addition to the primary pollutants identified by the State, Blind Brook is substantially affected by sedimentation, particularly in its tidal reaches (Central Avenue and south); one of two culverts under Playland Parkway has been completely filled in recent years and the need to dredge Milton Harbor has increased in frequency. Beaver Swamp Brook also is substantially affected by sedimentation throughout its length, a condition made worse by the relatively flat gradient of the stream in its lower reaches.

The goals and actions outlined in the Flood Mitigation Plan take into account the need to improve and protect water quality in these streams.

1.6.3 County Initiatives

1.6.3.1 Westchester County Stream Control Law

Enacted by the County in 1956 to address flooding concerns, the Stream Control Law[17] allows the County Department of Public Works to establish channel lines and grades for streams[18] by filing an order with the County Clerk after performing required studies and investigations, preparing a map showing channel lines and grades, and holding a public hearing. The effect of filing an order establishing channel lines and grades is that any person or municipality planning to do work within those lines, or 100 feet therefrom, must apply to the County Commissioner of Public Works for a permit. The purpose of the law is to prevent obstruction of channel flows and deterioration of stream channels, but its jurisdictional reach is limited. The law was not designed to comprehensively manage stormwater runoff from new development, or prevent increased flood flows or damage from excess runoff. However, for projects that require a permit, conditions may include requiring zero-increase in runoff, constructing structures above the FEMA 100-year base flood elevation, and erosion controls.

The Stream Control Law applies to 38 miles of stream segments throughout the county, the last of which was added to the program in 1965. Less than 25% of all eligible stream channel lines have been established, primarily due to the expense involved and local concerns.[19] Two miles of Beaver Swamp Brook and four miles of Blind Brook are included under the law.

[17] Chapter 853 of the Laws of 1956 adding Title D to Article 9 of the County Administrative Code; Title D is now found under Chapter 241 of Article III of the revised Administrative Code.

[18] Application excludes federal and state agencies, any part of the Hudson River, New York City water supply lands, or that part of any stream draining less than one square mile.

[19] 1985. Westchester County Soil and Water Conservation District. Westchester County Stormwater Management Program and Policy Proposal. 32 pp. plus appendices.

1.6.3.2 Nonpoint Source Pollution Planning for Long Island Sound

In 1992, as a result of the Long Island Sound initiative, increasing NPDES requirements for nonpoint pollution, and strengthened nonpoint efforts under the Coastal Zone Reauthorization Act of 1990, the County of Westchester initiated a nonpoint source planning program for its Long Island Sound watersheds. The county program established 6 watershed areas to be studied under the guidance of intermunicipal "Watershed Advisory Committees." The WAC studies developed ARCInfo GIS data layers for land use,[20] soils, hydrology, tidal and freshwater wetlands (existing and filled), detention facilities,[21] and 100-foot buffers for streams and wetlands, for use in preparing pollution control plans for each study area. The Blind Brook and Beaver Swamp Brook watersheds make up Watershed Advisory Committee 3 (WAC 3); the plan for this area was released in 1998.[22] Watershed Advisory Committee 3 developed specific study area recommendations on stormwater management basins, wetlands, streams, comprehensive plans and ordinances, and public outreach and education. The county recently implemented two water quality improvement projects in the City of Rye: streambank stabilization along a segment of Blind Brook and a salt marsh and dune restoration at the county's Edith Read Natural Park and Wildlife Sanctuary. Three more projects will begin in 2002: freshwater wetland restoration along a segment of Beaver Swamp Brook, salt marsh restoration at Milton Harbor, and vegetative restoration at the Read Sanctuary.

The Flood Mitigation Plan references aspects of the WAC 3 report that pertain to flooding and is consistent with its goals and recommendations.

1.7 Public Involvement

The City of Rye has had an ongoing community dialogue regarding flood control planning since the early 1960's. This dialogue occurs primarily through the City Council, Planning Commission and Conservation Commission/Advisory Council; the Planning and Conservation commissions are appointed citizen boards. The Blind Brook PL-566 project and the intermunicipal Beaver Swamp Brook stormwater management plan both arose as community initiatives and were fully supported by the City. This informal community dialogue is an important part of the city's flood control strategy and is expected to continue after the Flood Mitigation Plan has been finalized. The Flood Mitigation Plan also has been prepared in conjunction with two contemporaneous community planning efforts: the revision of the City's 1985 Development Plan under the direction of the Development Plan Update Steering Committee, and Project Impact.

1.7.1 1985 Development Plan Update

In August 1997, the Rye Development Plan Update Steering Committee conducted a community survey to invite comment on the goals and policies contained in the 1985 Plan. The 1985 Plan contains 10 chapters, one of which addresses flood control. Several other chapters, including "Environmental Protection" and "Coastal Resources,"

[20] Land use as of 1995.

[21] Facilities were identified and mapped by type: wet, dry or extended dry basins.

[22] 1998. Watershed Advisory Committee 3 and Westchester County Planning Department. Controlling Nonpoint Source Pollution in Long Island Sound: A Management Plan for the Beaver Swamp Brook, Blind Brook, Mamaroneck Harbor, Milton Harbor and Port Chester Harbor Watersheds.

are closely related. Thirty-four written responses were received from members of the City Council, the Board of Architectural Review, the Landmarks Advisory Committee, the Traffic and Transportation Committee, the Board of Appeals, the Conservation Commission/Advisory Council, the Recreation Commission, the Boat Basin Commission, the Rye Golf Club Commission, the Board of Assessment Review, the Citizen's Financial Advisory Committee, the Rye Free Reading Room, the Rye Historical Society, Resurrection Church, and the YMCA. Thirty-one respondents agreed with the flood control goal and policy stated in the 1985 Development Plan, as follows:

> GOAL To minimize risks to people and damage to property due to flooding in the Blind Brook and Beaver Swamp Brook watersheds and along the coast, through the enactment and enforcement of appropriate flood control measures.
>
> POLICY To prevent development in the designated floodways and discourage development in the 100-year floodplains of Blind Brook, Beaver Swamp Brook and the coastal areas through the use of land acquisition, regulations and flexible forms of zoning (e.g., clustering).

These respondents also recommended that in updating the Development Plan, the City do the following:

- add a policy to maintain Rye's stormwater storage basin and control structures at the Bowman Dam site;
- consider adding transfer-of-development rights (TDR) to the list of flexible zoning techniques;
- update the City's position regarding the Blind Brook Watershed Protection plan and components, specifically negating any proposal to construct dikes or modify the Oakland Beach Bridge;
- include a commitment to maintain and preserve natural retention/detention areas;
- include a stronger commitment to non-structural solutions to flooding;
- include a commitment to environmentally sensitive controls, and combine the Flood Control section of the Development Plan with the Environmental Protection section;
- seek additional comment on this topic from individuals with experience and expertise.

Two respondents (whose organization owns floodplain property) agreed with the goal but disagreed with the policy. One other respondent disagreed with both the goal and policy, stating that most of the floodplain already has been developed, making moot the regulation of remaining lands.

The Update Committee has re-drafted the flood control section of the 1985 Development Plan to reflect changes in policy and circumstance over the past 15 years. The proposal acknowledges the end of the Blind Brook Small Watershed Protection project, and incorporates elements of the County's Watershed Advisory Committee 3 Plan, the Beaver Swamp Brook Intermunicipal Working Group, and the Project Impact Technical Study now underway. The result is a draft flood control policy that builds on the 1985

Plan while strengthening some components and recommending new objectives, as follows:

- that the City pursue a flood mitigation land acquisition program that targets parcels critical to flood control and maximizes the related goals of passive recreation and environmental protection. Such multi-purpose acquisitions are more likely to qualify for funding under a wide variety of programs.

- that the City study its current coastal erosion control practices to identify additional measures to prevent damage to public shoreline and private properties.

- that the City work to meet FEMA community standards to reduce flood insurance rates citywide.

- that the City expand its current intermunicipal planning efforts on Blind Brook and Beaver Swamp Brook to achieve common watershed goals.

- that the City strengthen the priority given to floodplain and coastal zone management, erosion control and wetland protection in land use decision-making so as to encourage disaster-resistant development.

- that the City identify at-risk structures within the floodplain and develop a mitigation program to decrease vulnerability to flood damage.

- that the City analyze the storm water sewer system for possible upgrades to increase flood protection, and

- that the City identify and make road and bridge improvements to mitigate flood impacts.

1.7.2 Project Impact

In 1998, the City of Rye was designated a Project Impact community by the Federal Emergency Management Agency. The goal of Project Impact, to develop a disaster-resistant community, is being met through public and private sector partnerships that include 38 individuals and organizations (Appendix A). The Project Impact organizational structure also includes a Subcommittee on Flooding. Selected representatives of the Steering Committee and the subcommittee co-chairs reviewed this Flood Mitigation Plan.

The City also has participated in related county and federal/state water resource initiatives, including the Westchester County Nonpoint Source Pollution Planning program for Long Island Sound, and the US Environmental Protection Agency's Long Island Sound Study. Former Rye City Mayor Warren Ross serves as co-chair of the County's Nonpoint Source Pollution Committee.

The Flood Mitigation Plan has been circulated for public review and comment to the following federal, state and local agencies, boards and municipalities: the Federal Emergency Management Agency, USDA Natural Resources Conservation Service, US Army Corps of Engineers, New York State Department of Environmental Conservation, NYS Emergency Management Office, Westchester County Emergency Management Agency, Westchester County Soil and Water Conservation District, Town of Harrison,

Village of Rye Brook, Village of Port Chester, Town of Greenwich, Village of Mamaroneck, City of White Plains, City of Rye Planning Commission, City of Rye Conservation Commission/Advisory Council, and City of Rye Boat Basin Commission.

1.8 Coordination with Relevant Agencies

This document has been prepared in coordination with the following community citizen boards, advisory groups, and departments: the City Council, Planning Commission, Development Plan Task Force, Project Impact Subcommittee on Flooding, and Conservation Commission, the departments of Engineering, Building, Fire, Police, and Public Works. It has been circulated to neighboring communities, including the Town of Harrison, Village of Port Chester, and the Village of Mamaroneck, and to the Westchester County departments of Planning and Public Works, the New York State Emergency Management Office, the New York State Department of Conservation, the Federal Emergency Management Agency, and the US Environmental Protection Agency's Long Island Sound Study.

1.9 Procedure for Review and Revision of this Plan

The City of Rye Flood Mitigation Plan will be reviewed and updated at the completion of the Project Impact Technical Study and every three years thereafter.

2.0 Stream Segment Characteristics and Assessment

For purposes of this plan, the Blind and Beaver Swamp brooks have been divided into reaches; the coastal floodplain is discussed by drainage subarea (i.e., Port Chester Harbor, Milton Harbor, and Mamaroneck Harbor). All interior and coastal reaches have been mapped by FEMA.[23] These areas are classified as follows: The **100-year floodplain** (Zone A) is the area inundated by a storm having a probable occurrence of once in 100 years and is also known as the **base floodplain.**[24] The **500-year floodplain (Zone B)** is the area inundated by a storm having a probable occurrence of once in 500 years; areas mapped as Zone B also may be subject to 100-year flooding but with average depths less than 1 foot. Zones mapped **C** denote areas of minimal flooding. The **floodway** is the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment to carry the 100-year flood without substantial increases in flood height.

All flood elevations and streambed elevations presented in this plan are given in National Geodetic Vertical Datum (NGVD 1929). As part of the Project Impact Technical Study, the City recently completed a new Benchmark Grid Survey to increase the frequency of durable benchmarks to approximately 1 per 1000 feet along Beaver Swamp Brook, Blind Brook and Long Island Sound. The accuracy of 10 National Geodetic Survey monuments set in 1942 was determined, and 58 new benchmarks were set. **It is important to note that there is a difference of approximately 1.1 feet between the North American Vertical Datum (NAVD 1988) used for the new survey and**

[23] National Flood Insurance Program Flood Insurance Rate Map, City of Rye, NY Community Panel Nos. 360931-0001E, 0002E and 0003E last revised November 1, 1984; and NFIP Flood Boundary and Floodway Map, City of Rye, NY Community Panel Nos. 360931-0001, 0002, and 0003. These maps are being updated as part of the City's Project Impact Technical Study.

[24] The risk of a 100-year flood or one of greater magnitude increases when periods longer than 1 year are considered. For example, over a 30-year period, there is a 26% chance of experiencing a flood equal to or greater than the 100-year flood.

City of Rye Flood Mitigation Plan

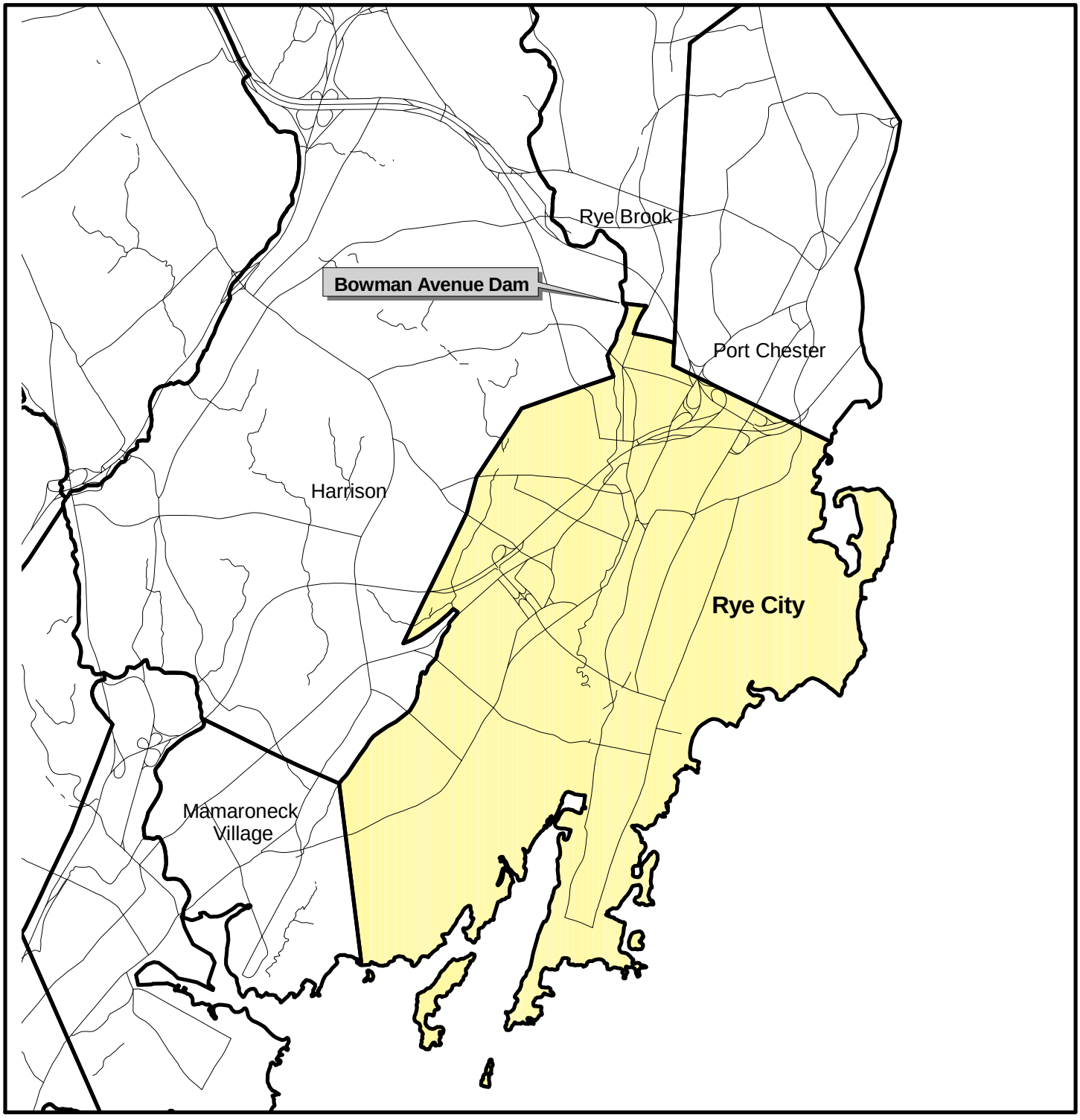


Figure 2.1:

Bowman Avenue Dam Property

Streams
Municipal Boundary
Major Roads

N

Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

the NGVD 1929 used as a primary reference prior to 1988. For example, NGS monument TIDAL 5 is used as a reference mark in the current FEMA Flood Insurance Rate Map for the City of Rye. The elevation of TIDAL 5, based on the NGVD 1929, is listed as 11.82 feet on the FIRM, whereas it is listed as 10.71 feet in the NGS data sheets and this document, a difference of 1.11 feet. Therefore, care must be used when comparing elevations taken from historical documents or drawings against those using the new benchmark survey.

2.1 Blind Brook

2.1.1 Bowman Dam Property

The Bowman Avenue Dam property is located in the Village of Rye Brook on the main stem of Blind Brook; it is upstream from the City and the Cross Westchester Expressway, and downstream from Bowman Avenue (Figure 2.1). The 11-acre property supports an upper reservoir, dam, and lower pond, and is the only regional flood control facility owned by the City. As part of its Project Impact Technical Study, Rye is evaluating the potential to increase flood storage at the site.

2.1.1.1 Background and History

The original dam at the Bowman Avenue site was built circa 1900 to create a pond for ice production. In 1941, this dam was replaced by the existing structure, a vertical concrete wall with a 20-foot-long notch-cut spillway and a 15- by 8-foot rectangular low-level outlet located just beneath the spillway. The structure impounds the upstream reservoir and is founded on a rock outcrop that forms a natural dam at that location. The low-level outlet has been partially blocked by wooden planks, significantly reducing the opening to 15- by 1-foot.

The Lower Blind Brook Pond is a flooded abandoned quarry immediately downstream from the dam. The pond is fed by the main stem of the brook as well as the east branch that enters from a culvert under Bowman Avenue. The outlet from the Lower Pond is controlled solely by the water level in the receiving stream.

A survey of aerial photographs from 1925 indicates that the dam, reservoir, and lower pond have changed considerably over the past 75 years. In 1925, there was a large reservoir upstream from the dam but no lower pond. By 1954, the upstream pond had been reduced in size and the downstream channel moved to the north for a quarry operation at the site. By 1976, the quarry operation had been abandoned and the excavation site was flooded by Blind Brook to form the Lower Pond. Between 1986 and 2000, the north shoreline of the quarry was filled to create a peninsula extending 280 feet into the Lower Pond. Over this same time period, the reservoir upstream from the dam grew progressively smaller, to less than one-quarter of its original size by 2000.

2.1.1.2 Stormwater Management and Flood Control

The drainage area upstream from the Dam approximates 3800 acres. An additional 600 acres are drained by the east branch of Blind Brook and the Lower Pond. The storage volume of the reservoir upstream of the dam is estimated to be 120 acre-feet, with an additional 35 acre-feet provided by the Lower Pond. Analysis of aerial photography shows that filling along the north edge of the pond has reduced its storage volume by as much as 3 acre-feet, or approximately 8%.

Total stormwater runoff to the Bowman Avenue Dam and Lower Pond from the 100-year, 24-hour storm event approximates 1700 acre-feet. The total storage available in both the reservoir and pond is about 155 acre-feet (roughly 9% of the total runoff), theoretically sufficient to attenuate some flow and reduce downstream flooding. However, due to the reduced storage volume in the upper reservoir and the limited outlet capacity, the dam is overtopped during relatively frequent storm events. This loss of storage is likely due to siltation and renders the low-level outlet too restrictive to pass even low-intensity storms. In their current condition, the dam and reservoir cannot effectively control flood flows. This situation is mitigated somewhat by the fact that the Lower Pond provides added storage even though it was not specifically designed for this purpose.

2.1.1.3 Conceptual Plans for Storage Enhancement

Preliminary investigations conducted as part of the Project Impact Technical Study indicate that the Bowman Dam facility could be modified to significantly increase flood control benefit to downstream properties. Possible activities to increase storage at the site include excavating the upper reservoir to remove accumulated sediment and restore its original volume; expanding the upper reservoir; lowering the low-level outlet at the dam; and modifying the Lower Pond outlet to increase the 100-year surface water elevation. If all of these measures were implemented, the City could nearly double the floodwater storage capacity at the site. This level of improvement likely would reduce or eliminate repetitive flood insurance claims in some downstream areas.[25]

Additional information is being developed as part of the technical study to allow the City to assess the feasibility, costs and benefits associated with the conceptual modifications.

2.1.1.4 Property Protection

In recent years, development has been proposed for land adjacent to the dam site. Due to its flood control functions and the potential for improvements that would protect downstream residents in both Rye Brook and Rye, the City has placed a high priority on protecting the Bowman Avenue property from inappropriate development.

2.1.2 Rye City/Rye Town Corporate Line to I-95/New England Thruway

2.1.2.1 Mapped Floodplains

<u>City Line to Purchase Street</u>

The northernmost reach of Blind Brook within the incorporated City limits runs from the City line south to the New England Thruway (Figure 2.2). From the City line to Purchase Street (Rte. 120), the 100-year floodplain ranges 350-450 feet in width east of the brook, with the 500-year floodplain extending an additional 200 feet north of the Hillside/Ridge Street intersection. The floodway extends 240 feet east of the brook at the City line, narrowing to 25 feet at Purchase Street. Base flood elevations in this area range from 35 feet NGVD at the City line to 33 feet at Purchase Street; corresponding stream bed elevations are 23 and 20.25 ft, a drop of 2.75 feet over 1650 feet of stream. Several single-family homes along Ridge Street are located within the

[25] A repetitive loss property is one for which two or more NFIP losses of t least $1000 each have been paid since the City began participating in the program.

City of Rye Flood Mitigation Plan

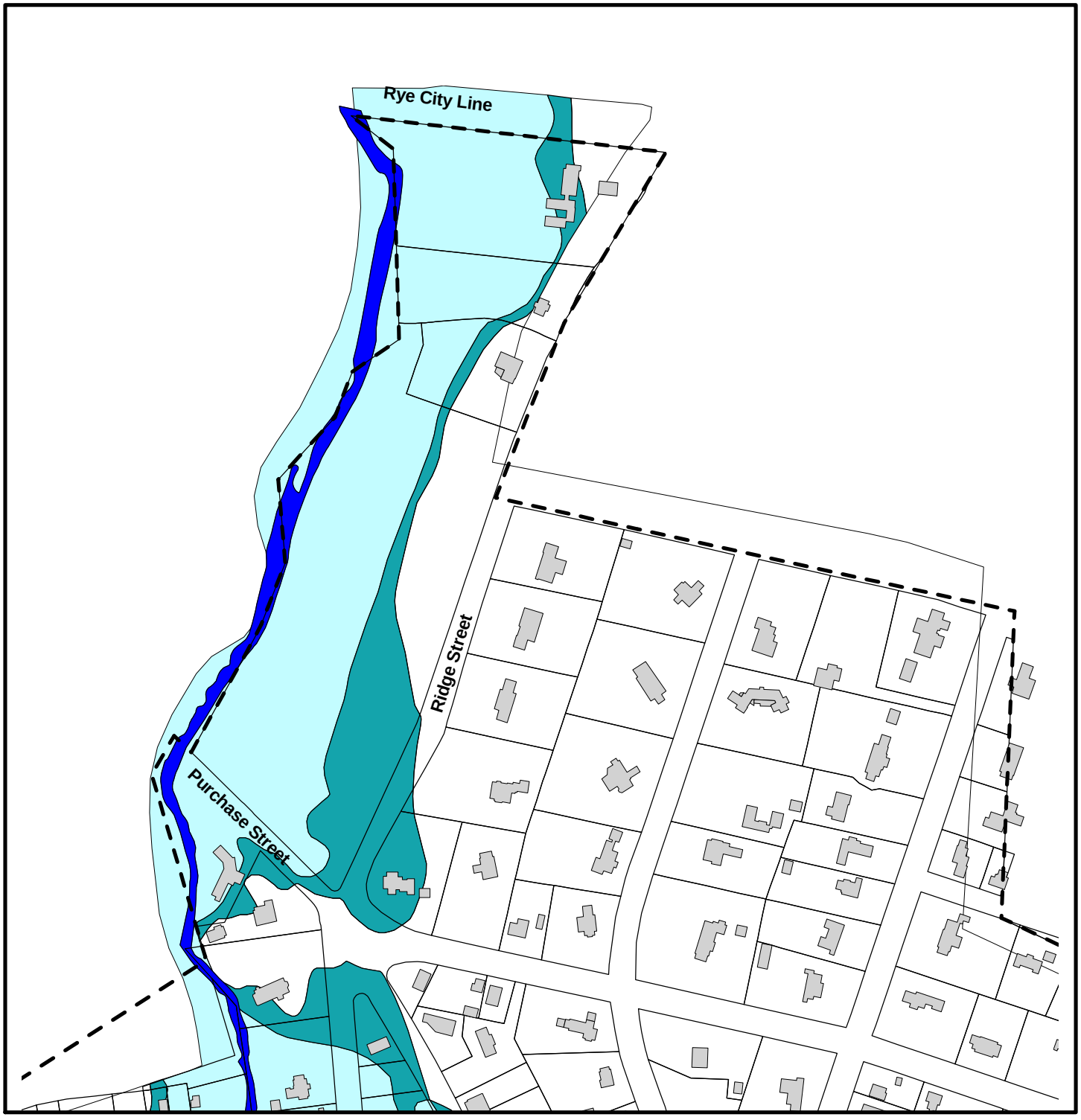
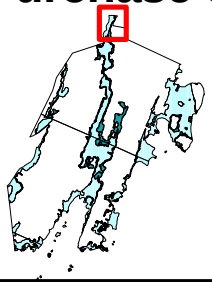


Figure 2.2:

FEMA Floodplains - City Line to Purchase Street

City Line (approx.)
Buildings
Property Boundaries
Water/Streams
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

City of Rye Flood Mitigation Plan

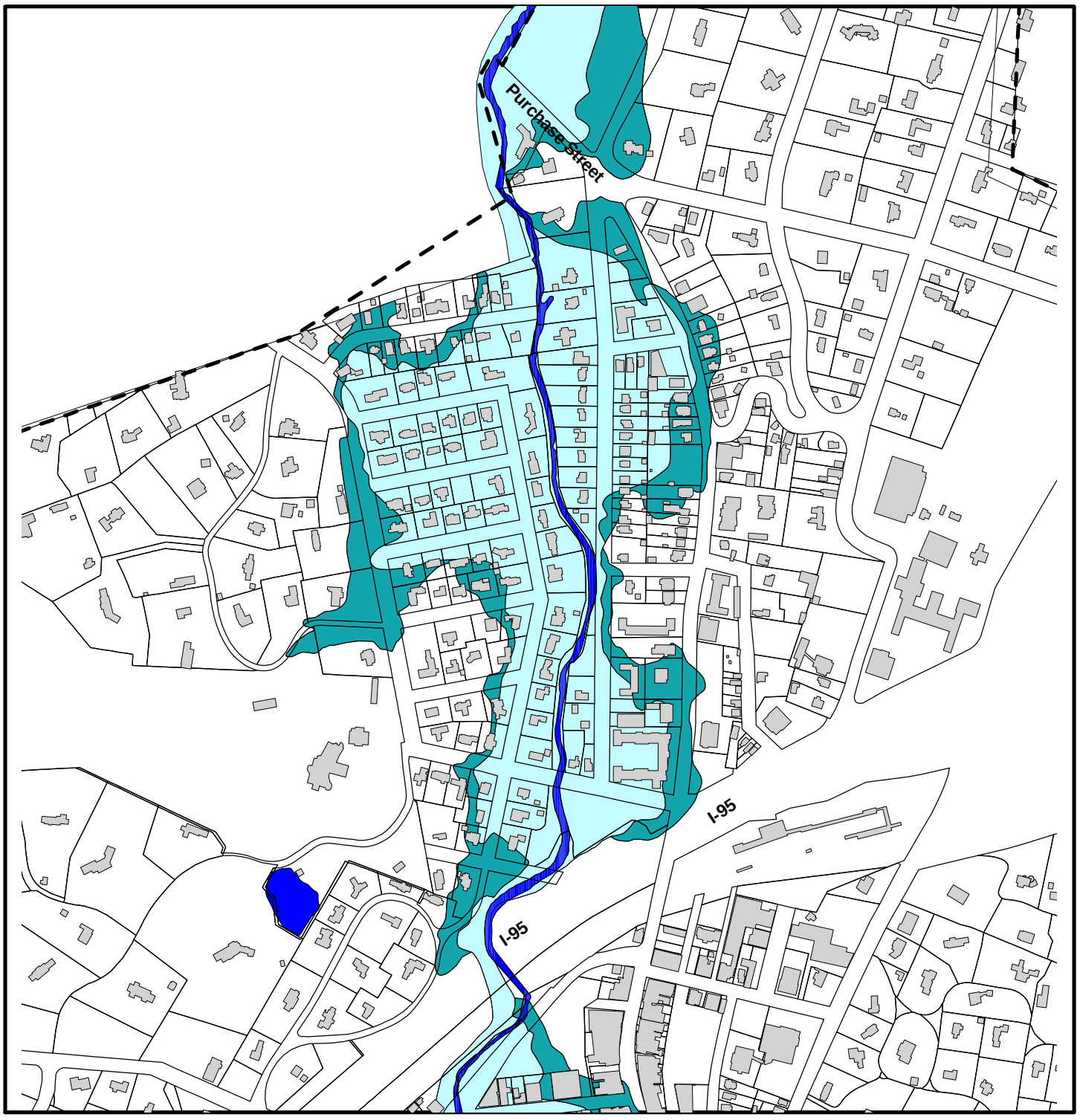
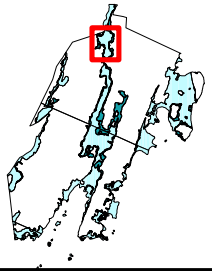


Figure 2.3:

FEMA Floodplains - Purchase Street to I-95

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

500-year floodplain; however, most of the 100-year floodplain in this area is occupied by an undeveloped parcel known as the Matthews Estate.

Purchase Street to I-95

From Purchase Street south to the New England Thruway, the brook drains a residential area of the City known as "Indian Village." (Figure 2.3) The 100-year floodplain ranges between 100 and 700 feet in width on each side of the brook, with the 500-year floodplain extending an additional 50-275 feet. Within the 100-year floodplain, the floodway extends 10-80 feet west of the brook and 40-200 feet east of the brook. Base flood elevations in this area range from 33 feet at Purchase Street to 29 feet immediately south of Highland Road; corresponding stream bed elevations range from 20.25 to 16.5 feet, a drop of 3.75 feet over 2950 feet of stream. Land uses within the floodplain areas include commercial uses between Hillside Road and Blind Brook Lane; single-family residential, mixed residential, multifamily, and office uses from Hillside Road south to Highland Road.

2.1.2.2 Flood Insurance Claims[26]

None of the properties within the 100- or 500-year floodplains along Ridge and Hillside streets has filed more than a single flood insurance claim since the City began participating in the program. Alternatively, 30 homeowners within Indian Village have filed more than one claim; one of these properties is within an area mapped as Zone B.[27] The Indian Village properties represent one-third of the repetitive claimants in the City.

2.1.2.3 Flooding Problems

Drainage problems occur at the intersection of Ridge Street, Wappanocca Avenue and Hillside Road during the 100-year and higher frequency storm events. Before reconstruction, the bridge at Purchase Street would be under water; the degree to which rebuilding has improved this situation is not yet known. Additional roadway flooding occurs at Meadow Place, Blind Brook Lane, Mohawk, Oneida and Onondaga streets, the lengths of Mendota and Wappanocca avenues, and along Highland Road. Highland Road and the bridge are under water during a 25-year storm event. Ponding upstream of the I-95 culvert constrains access to Ridgewood Drive.

Additional problems identified in the "Alternatives for Watershed Protection and Flood Prevention: Blind Brook Watershed, Westchester County, New York,"[28] (hereafter "Alternatives Study") include limited access for homes west of Ridge Street, bordering the Matthews Estate; flooding of Highland Hall Apartments, and flooding at the Rye Medical Center.

2.1.2.4 Infrastructure Problems

No infrastructure problems have been reported for this stream segment.

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[26] Not all homeowners within the mapped flood zones hold flood insurance policies either because ownership predates City participation in the program or because they did not finance through a lending institution requiring a policy.

[27] On the Flood Insurance Rate maps, Zone B denotes areas between the limits of the 100- and 500-year floods or certain areas subject to the 100-year flood with average depths less than 1 foot.

[28] USDA Soil Conservation Service. 1978. Pp. 1-4.

2.1.2.5 Critical Facilities[29]

Westchester County maintains a sewer trunk that runs beneath the I-95 culvert; no problems associated with flooding have been reported for this facility.

2.1.2.6 Flood Control/Stormwater Management Facilities

There are no flood control facilities associated with this stream segment.

2.1.2.7 Riparian[30] Character/Significant Natural Resources

From the City line south to Purchase Avenue, the Blind Brook channel is approximately 30 feet wide and lined by stone to a height of 6 feet. Surrounding residential land use has eliminated the natural riparian zone; however, a significant undeveloped property immediately north of Purchase Street accommodates overbank flows during storm events. From Purchase Street south to the Thruway, the channel narrows to 20-25 feet and is lined by fencing. The riparian area is limited (less than 25 feet wide) and characterized by lawn and woody vegetation. The stream banks are eroding immediately downstream of Purchase Street, and at three additional locations along the brook to the Thruway.[31] Downstream from Highland Road, the stream banks are being undercut by storm flows.

Indian Village and Dogwood Lane and Upper Dogwood Lane are noted in the 1985 Development Plan as sites of local or national register significance.

2.1.2.8 Development Trends in the Floodplain and Natural Resource Areas

Within this stream segment, the Matthews Estate is the only significant undeveloped parcel. This property floods during more intense storm events; development of this site likely would exacerbate downstream flooding. The remaining floodplain properties from the City line south to I-95 have been developed for commercial and residential uses with limited potential for infill.

2.1.3 I-95 to Rye High School Footbridge

Segment 2 of Blind Brook runs from I-95 south through the City's Central Business District and residential areas to the footbridge at the Rye High School.

2.1.3.1 Mapped Floodplains

<u>I-95 to Orchard Avenue</u>

Between I-95 and Locust Avenue, the brook meanders sharply due to the I-95 embankment along its west bank (Figure 2.4). There is no 100-year floodplain west of the brook from I-95 to Elm Place but it ranges between 350-700 feet from Elm Place to south of Mead Place; east of the brook, it varies from 40-320 feet. West of the brook,

[29] Critical facilities are buildings, infrastructure or sites identified by the City either to be vital to the community or to pose a special hazard during a flood event.
[30] "Riparian" refers to land situated along the bank o f a stream or other body of water.
[31] 1998. Controlling NPS Pollution in Long Island Sound: A Management Plan for the Beaver Swamp Brook, Blind Brook and Coastal Watersheds. Watershed Advisory Committee 3 and WC Department of Planning. P.66

City of Rye Flood Mitigation Plan

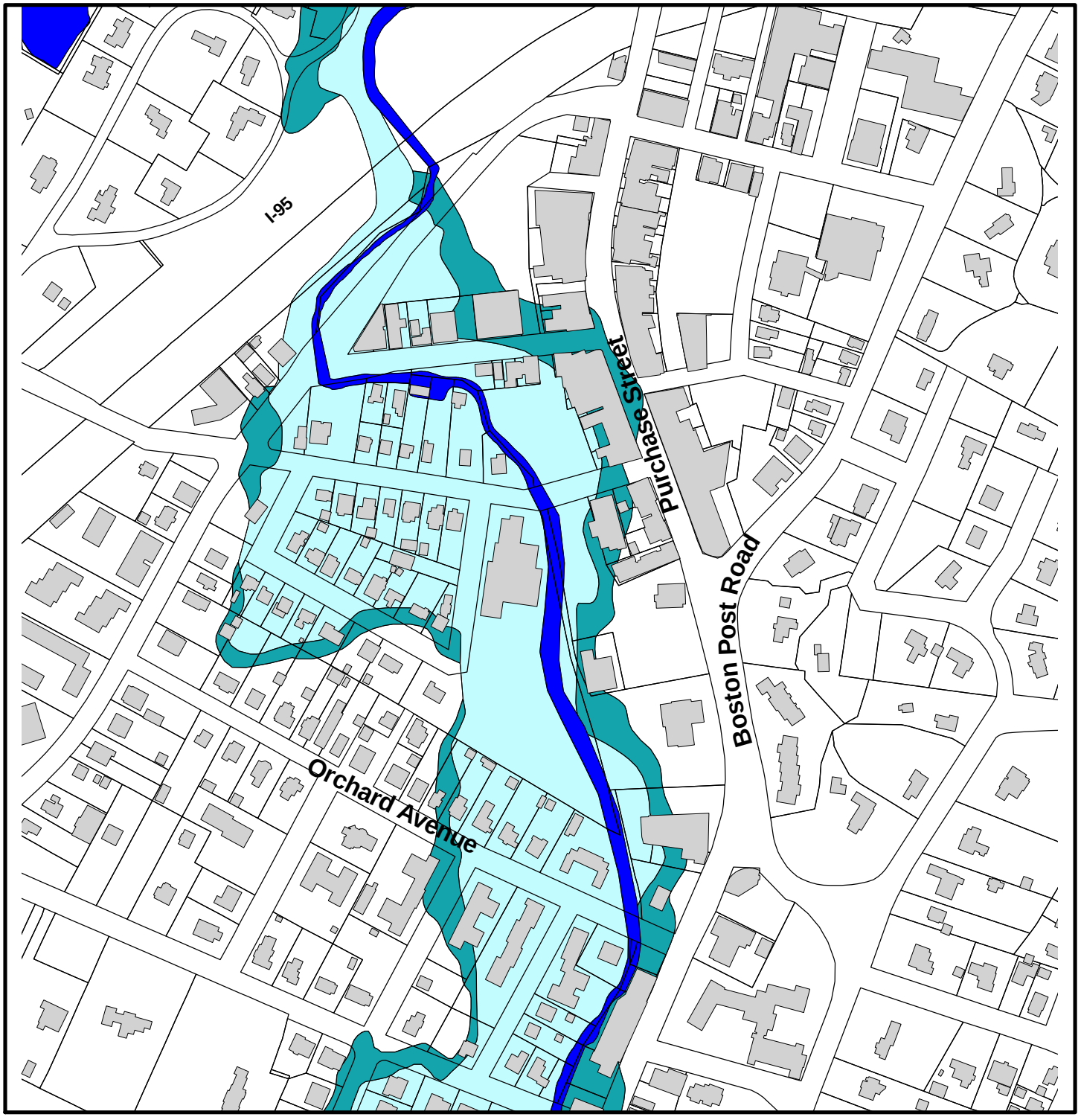
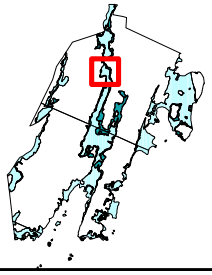


Figure 2.4:

FEMA Floodplains - I-95 to Orchard Avenue

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



N

Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

City of Rye Flood Mitigation Plan

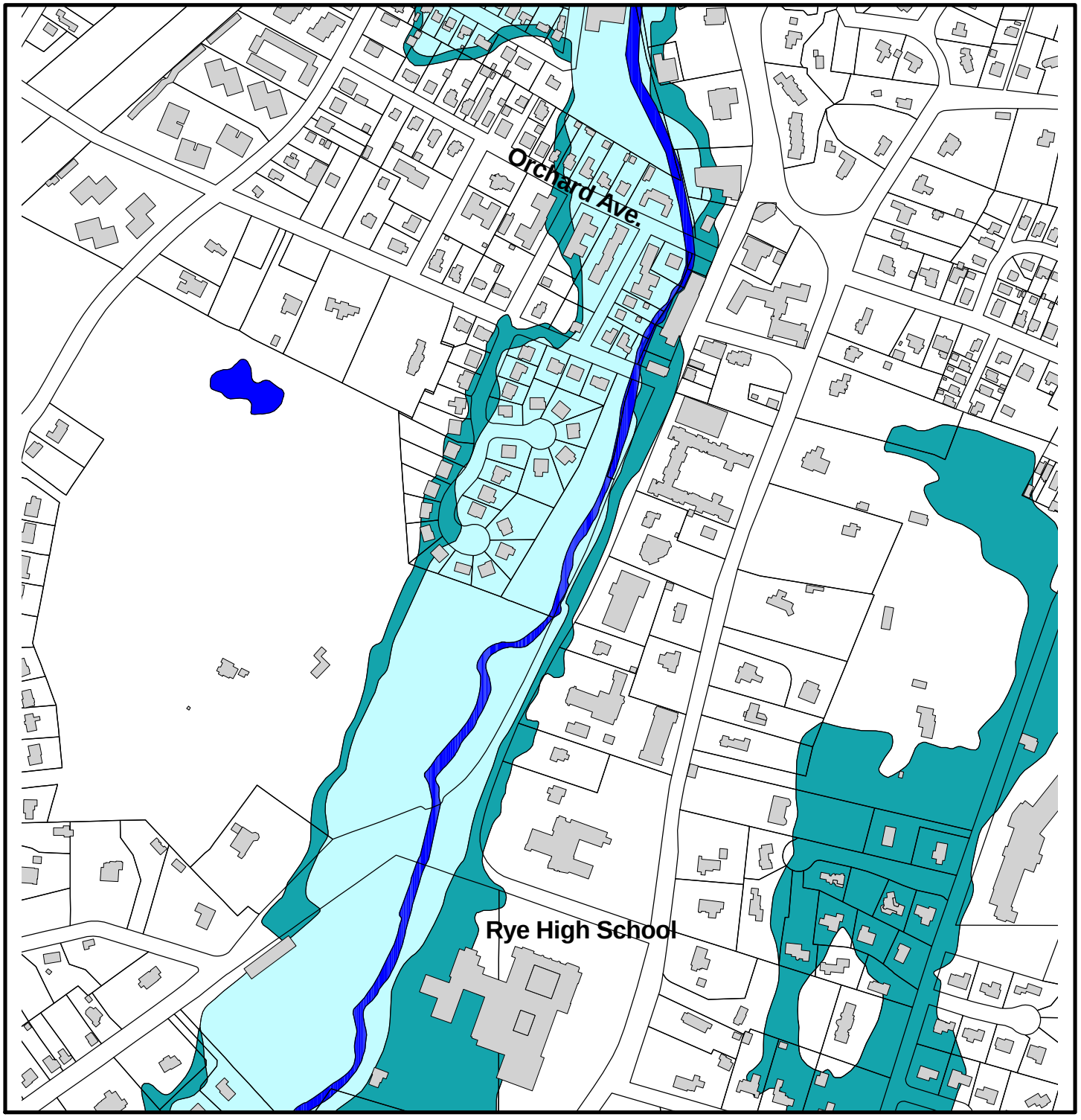
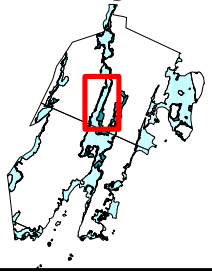


Figure 2.5:

FEMA Floodplains - Orchard Ave. to Rye HS Footbridge

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

the 500-year floodplain coincides with the 100-year or extends only an additional 40 feet; east of the brook, it exceeds the base floodplain by 120 feet. Because of the thruway embankment, the floodway extends only eastward (approximately 200 feet) between Theodore Fremd and Elm Place; west of the brook it averages 150 feet in width at Elm south to Orchard Avenue. Base flood elevations in this area range from 29 feet immediately north of I-95 to 24 feet at Locust Avenue to 21 feet at Orchard Avenue (corresponding stream bed elevations are 15.25, 10.5 and 7.75 feet, a change of 7.5 feet over 2615 feet of stream).

A significant part of the City's Central Business District (CBD) west of Purchase Street (Route 120) is located within the 100- and 500-year floodplains, extending from Purdy Avenue south to the intersection of 120 and Boston Post Road. Numerous small businesses, offices, and 1-, 2-, and multi-family dwellings are located within this area. From Locust Avenue south, parts or all of the YMCA, Rye Free Reading Room, Rye Historical Society's Square House, and City Hall properties occupy the base floodplain; several of these also encroach on the floodway.

Orchard Avenue to Rye HS Footbridge

From Orchard Avenue south, the brook flows through residential, commercial, and institutional land uses to the High School footbridge 880 feet south of Parsons Street (Figure 2.5). In this area, the floodway varies between 20-280 feet west of the brook and from 20-120 feet east of the brook. The 100-year floodplain ranges from 160-480 feet west and 20-150 feet east of the brook. The 500-year floodplain extends 20-120 feet east and 20-400 feet west of the base floodplain. Base flood elevations in this area range from 21 feet NGVD immediately south of Orchard Avenue to 15 feet at the High School footbridge; corresponding stream bed elevations are 7.75 and 3.5 feet, a 4.25-foot change in elevation over 3140 feet of stream length.

From Orchard Street to the High School footbridge, uses within the floodway and base floodplain include gas stations, restaurants, residential units, and institutional facilities, including the Rye High School. The floodway/floodplain area along approximately 600 feet of brook between Loewen Court and Parsons Street was acquired by the City for the Rye Nature Center and has been protected in its natural state.

2.1.3.2 Flood Insurance Claims

Ten (10) property owners between Elm Place and Orchard Lane have filed more than one flood insurance claim since the City began participating in the program; only one of these properties is located east of the brook. Five (5) additional property owners between Orchard Avenue and Parsons Street have filed repeat claims. Claims in this stream segment represent 16% of all repetitive claims filed by property owners in the city.

2.1.3.3 Flooding Problems

Drainage problems occur during severe storm events throughout much of the Central Business District west of Boston Post Road south of I-95 to Orchard Avenue. Of particular concern is roadway flooding on Elm Place, Locust Avenue and Mead Place, and flooding at the municipal parking lots between Theodore Fremd and Locust Avenue, and near the YMCA. During the 100-year storm, the bridge at Orchard Avenue is under water. South of Orchard Avenue, there is ponding at the library and City Hall, along Laurel Street, at Central Avenue near the brook crossing, at Barbara and Loewen

courts, and along the Boston Post Road between Resurrection Church and the private drive south of the Rye Nature Center. During extreme storm events, access to the Rye Nature Center is cut off, and the athletic fields at the high school are flooded.

2.1.3.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.1.3.5 Critical Facilities

The Locust Avenue fire department is located on Locust Avenue within the floodway and base floodplain, raising concerns with access and protection of equipment during severe storm events. Because of the proximity to the brook, and to maintain fire coverage for parts of the city both east and west of the brook, the Fire Chief may decide to relocate trucks to other areas during severe storm events. Other uses vulnerable to flooding in this area include gas stations at the corner of Orchard Avenue and Boston Post Road, and on the Post Road between Orchard and Central avenues. These facilities risk petroleum storage tank rupture and fire during extreme flood events.

2.1.3.6 Flood Control/Stormwater Management Facilities

A dry detention basin has been constructed near Summit Avenue to control stormwater flows; this location is well away from the floodplain and floodway areas.

2.1.3.7 Riparian Character/Significant Natural Resources

The average width of the brook from I-95 south to Central Avenue is approximately 20 feet. Throughout this segment, the banks are reinforced and interspersed with woody vegetation, and the riparian zone is less than 25 feet wide. A small section of the channel is eroding upstream of the Locust Avenue bridge.[32] South of Central Avenue to Boston Post Road, the brook flows through a wooded area extending 150-300 feet west of the channel; this segment of stream is well shaded and includes part of the Rye Nature Center. Downstream from the Post Road, the brook flows through school property and is grassed and eroding to the footbridge; athletic fields and facilities occupy the floodplain up to the stream banks.

Significant natural resources within this segment include the Rye Nature Center riparian wetlands and adjacent upland.

The Central Business District and Grace Church Street Area are listed as sites of local or national historic significance in the 1985 Development Plan. The Village Green has been locally designated a Preservation District, and Church Row has been proposed as a National Register District.

[32] See footnote 25.

2.1.3.8 Development Trends in the Floodplain and Natural Resource Areas

There are no significant, undeveloped private land holdings within this segment of Blind Brook and no large new developments are anticipated. However, the YMCA and Rye Free Reading Room both have proposed to expand their facilities within the base floodplain. The City Planning Commission required a comprehensive hydrologic study of the two projects to assess their impact on Blind Brook flooding. Based on the study, the YMCA received final site plan approval. The Rye Free Reading Room received preliminary site plan approval; however, they have since proposed to modify the location of the addition to their building and the City Planning Commission has required an update of the hydrologic study to assess the impacts of this project revision on Blind Brook flooding.

Within the past 10 years, the high school constructed a new middle school addition to its senior high complex within flood Zone B; further construction may occur if public school enrollments increase and additional classrooms are needed.

2.1.4 Rye High School Footbridge to Oakland Beach Avenue

Segment 3 extends south from the high school, through residential, natural open space, and parkland uses to the Oakland Beach Avenue Bridge. It also includes an unnamed tributary east of the main stem of Blind Brook, which runs through residential neighborhoods.

2.1.4.1 Mapped Floodplains

<u>Rye High School Footbridge to Oakland Beach Avenue (Main Stem)</u>

From the high school footbridge south to Playland Parkway, the 100-year floodplain ranges in width 400-650 feet (Figure 2.6); at Playland Parkway, the floodplain broadens considerably to 2240 feet due to flows contributed by an unnamed tributary between Mayfield Street and Rye Beach Avenue (see below). The 500-year floodplain in this area extends 400-800 feet beyond the base floodplain east of the brook. The floodway averages 300 feet in width to Playland Parkway, and increases to 600 feet before narrowing again to 100 feet south of Rye Beach Avenue. Base flood elevations in this segment range from 15 feet at the high school footbridge and Brookdale Place, to 14 feet at the Oakland Beach bridge; corresponding stream bed elevations are 3.5, 1.5 and -.5 feet NGVD over 5660 feet of stream length.

North of Playland Parkway, single-family homes on Pine Lane and Brookdale Place south to Haven Avenue are within the base floodplain and Zone B. South of the parkway and west of the brook, homes along Thorne Place and the easternmost section of Sonn Drive, and Crescent Avenue are within the base floodplain. Westchester County's Blind Brook sewage treatment plant is located off Preston Street but outside any flood zone. East of the brook, most of Milton Road to Oakland Beach Avenue is within the 100-year zone, with portions of Hill Street and Vale Place in Zone B.

<u>Blind Brook Tributary East of Main Stem</u>

An unnamed tributary rises in a wetland east of the main stem of Blind Brook, at Ridgeland Terrace (Figure 2.7). It occurs seasonally in its upper reach, but is perennial south of Playland Parkway; it joins the main brook west of Milton Road at Rye Beach

City of Rye Flood Mitigation Plan

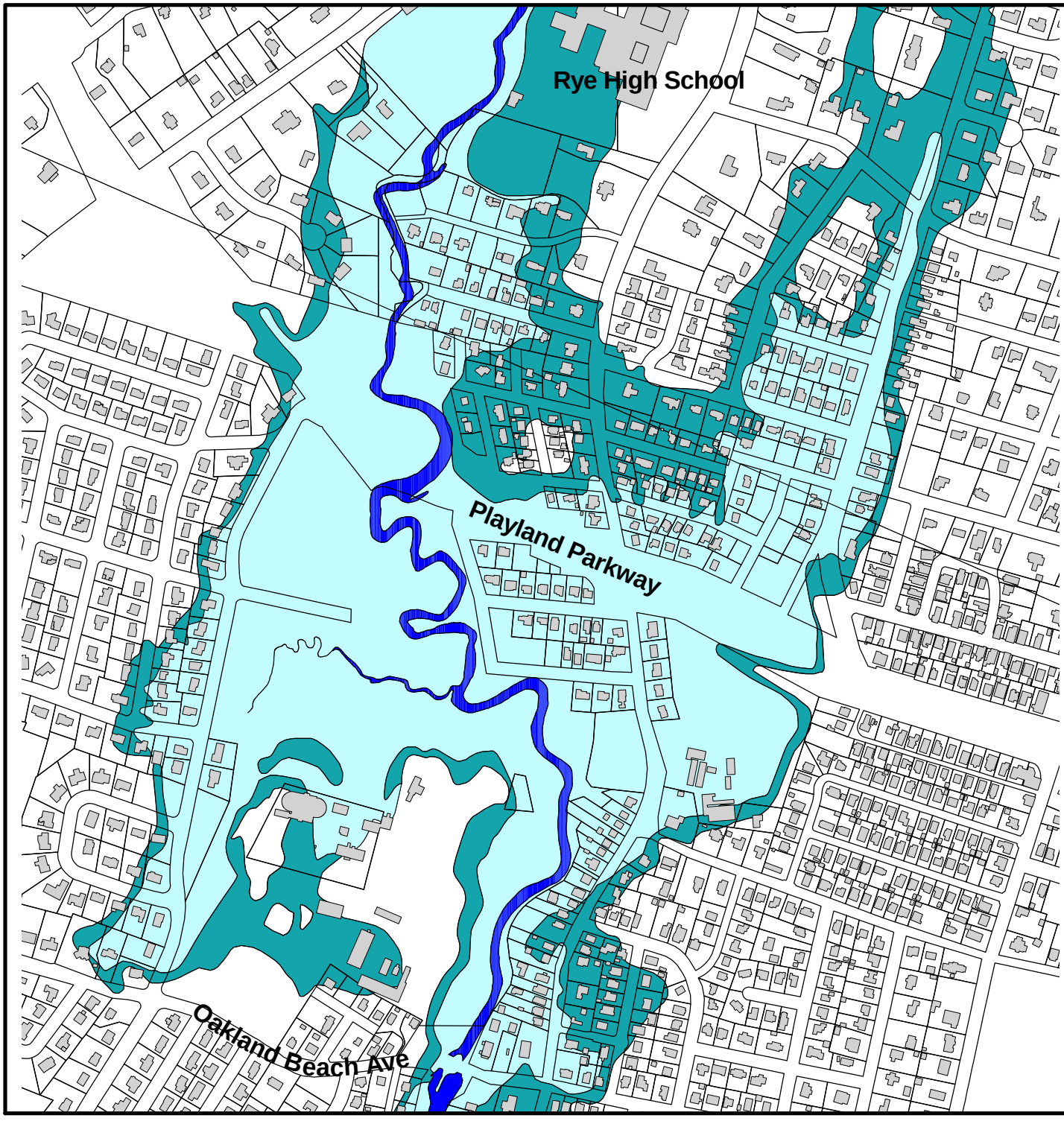
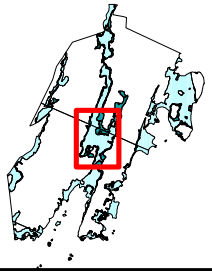


Figure 2.6:

FEMA Floodplains - HS Bridge to Okld. Bch. Ave.- Blind Brook

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

City of Rye Flood Mitigation Plan

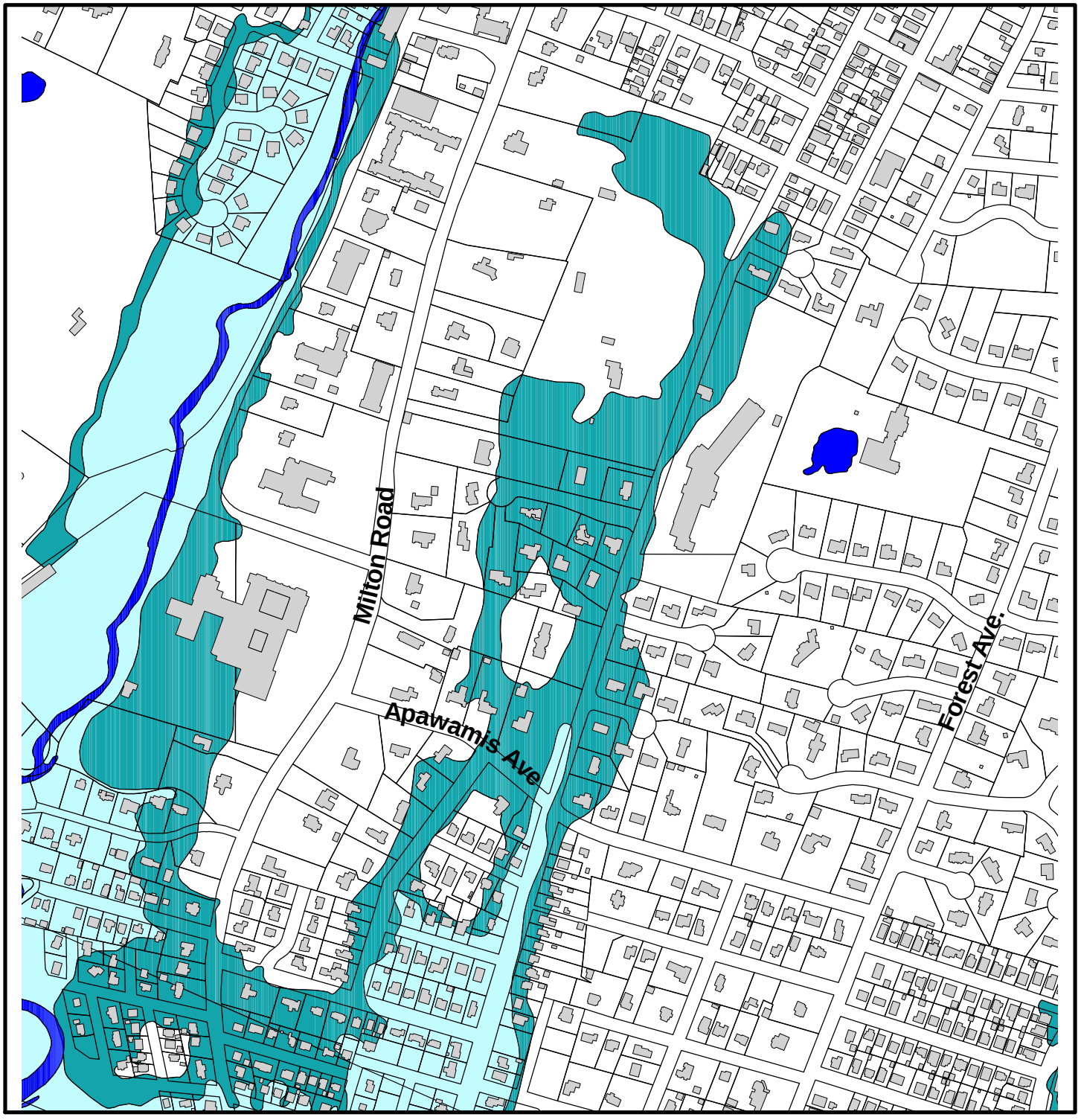
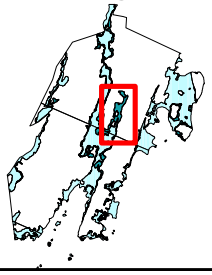


Figure 2.7:

FEMA Floodplains - Blind Brook Tributary East of Main Stem

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

Avenue. The 100-year floodplain associated with this tributary begins at Midland Avenue immediately south of Lea Place and is approximately 120 feet wide until just south of Hillcrest Lane where it expands to 600 feet. It extends south to Beachwood Lane where it broadens to join the 100-year floodplain associated with the main stem. The 500-year floodplain (or Zone B) is mapped considerably north, at Goldwin Street; it variably extends 200-800 feet west of, and including Midland Avenue, south to Lea Place. No floodway has been mapped for this tributary. Base flood elevations from Lea Place to south of Intervale Place are 15 feet NGVD.

2.1.4.2 Flood Insurance Claims

Repetitive loss claims have been filed by property owners on Midland Avenue north of Parsons Street, on Pine Lane and Brookdale Place, and at the west end of Orchard Avenue. Other repetitive claims have originated from Crescent Avenue, Charlotte, Ellsworth, and Mayfield streets, and Milton Road at Ellsworth and Vale Place. Total claims for this segment represent 15% of all repetitive claims.

2.1.4.3 Flooding Problems

West of the brook, roadway drainage problems occur along Crescent Avenue, sections of Thorne Place, and the access roads to the City's Disbrow Park. East of the brook, ponding occurs along Pine Lane, the west end of Brookdale Place, Charlotte Street, Ellsworth, and Mayfield streets; these last three streets are under water during the 10-year and lower frequency storms. Sections of Midland Avenue from Goldwin Street to Playland Parkway, and Milton Road between Playland Parkway and Oakland Beach Avenue also flood in low-lying locations. Midland Avenue and Milton Road are collector streets; access along Milton Road is important to allow fire trucks located at the Milton Point Fire Station to respond to emergencies (see Segment 4).

2.1.4.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.1.4.5 Critical Facilities

Westchester County owns and operates the Blind Brook sewage treatment plant facility at Disbrow Park. Historically, this facility has been incapable of processing all sewage during heavy rainfalls; this causes sewage to back up in sections of the floodplain and to discharge untreated material to the Sound.

The City's DPW and solid waste/recycling station also are located at Disbrow Park; however, there have been no flood-related problems at these facilities.

2.1.4.6 Flood Control/Stormwater Management Facilities

Four stormwater detention basins (3 dry, 1 wet) are situated at the edge of the Blind Brook basin in the general vicinity of this segment; all are a considerable distance from the brook and floodplain. Mead Pond functions as a wet basin and is located between Mead Pond and Sharon lanes. One of the dry basins is located at the corner of Playland Access Road and North Street/Old Post Road; the other two are sited along

Boston Post Road immediately west of its intersection with Old Post Road. These basins were built in accordance with City surface water management regulations.

2.1.4.7 Riparian Character/Significant Natural Resources

The riparian area south of the high school to Playland Parkway is limited by surrounding residential development; however, this segment contains a significant high marsh tidal wetland complex south of the high school and extending to Disbrow Park. This segment also contains significant freshwater wetlands north of Playland Parkway at Midland Avenue and south of the parkway to Milton Road and Rye Beach Avenue.

The Timothy Knapp House at the corner of Milton Road and Dearborn Avenue, and the Milton Cemetery west of Milton Road and slightly north of the Knapp House are listed on the National Register of Historic Places.

2.1.4.8 Development Trends in the Floodplain and Natural Resource Areas

According to the 1985 Development Plan, areas designated for low-medium density residential uses (2-6 dwelling units/acre) are currently developed; none represent oversize lots. The natural open space occupied by high marsh wetlands north and south of Playland Parkway is protected by state and local wetland laws, and no further development is anticipated in this area. Disbrow Park is designated parkland and will continue to provide municipal and parkland uses. The City is in the process of acquiring the former Rye Nursery, an approximately 7-acre property south of Playland Parkway, between Milton Road and Rye Beach Avenue, for wetland restoration and park uses.

2.1.5 Oakland Beach Avenue to Milton Harbor (at Soundview Avenue)

2.1.5.1 Mapped Floodplains

From Oakland Beach Avenue, Blind Brook runs approximately 1800 feet to Milton Harbor at Hewlett Avenue (Figure 2.8). The 100-year floodplain in this reach varies from 120-1000 feet wide; the 500-year floodplain (Zone B) extends an additional 120-400 feet from the east edge of the base floodplain depending on location. The floodway ranges from 110 feet at Oakland Beach Avenue to approximately 500 feet in width at the harbor. Base flood elevations range from 13 feet immediately south of the Oakland Beach Bridge to 14 feet at the floodway limit at the harbor; corresponding streambed elevations are -1 and -3 feet NGVD.

West of the brook, single-family homes along Harbor Terrace Drive and at the end of Watson Court are within either the base floodplain or Zone B; east of the brook, properties on Locust Lane, Milton Road, Garden and Orchard drives, the eastern end of Fairlawn Street, and lower Hewlett Avenue are within the 100- and 500-year floodplains.

2.1.5.2 Flood Insurance Claims

Property owners at Garden Drive, The Lane, and Hewlett Avenue at Milton Road have filed more than one flood insurance claim since the program was adopted in 1978, representing 3% of the repetitive claims in the City.

City of Rye Flood Mitigation Plan

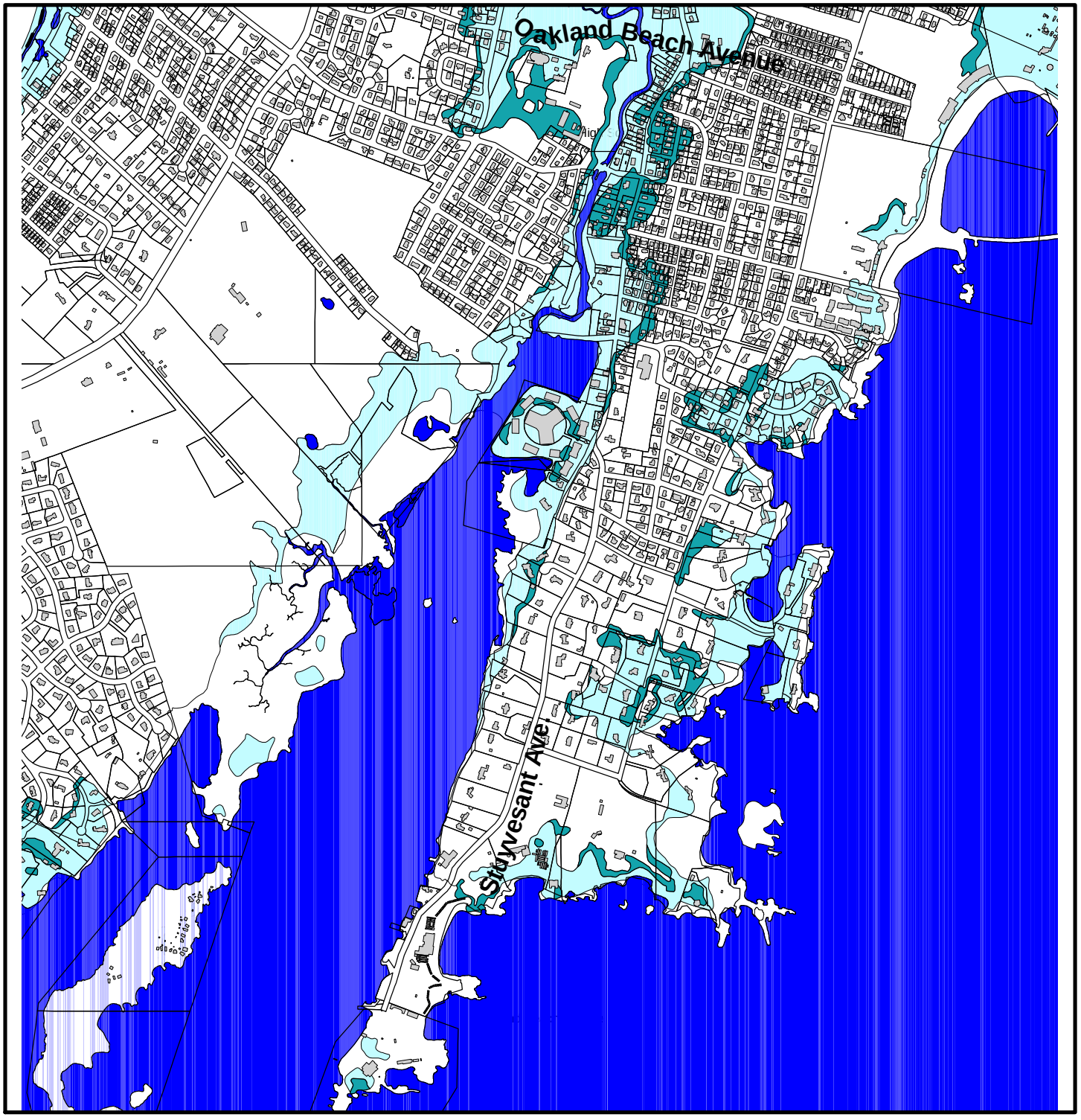
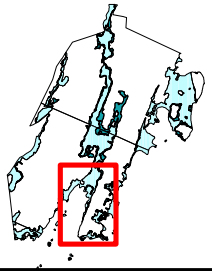


Figure 2.8:

FEMA Floodplains - Oakland Beach. Ave. to Milton Harbor

City Line (approx.)
Buildings
Property Boundaries
Water/Streams
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

2.1.5.3 Flooding Problems

Ponding occurs during the 10-year and more intense events, with or without coastal influence, along Milton Road from Dearborn Avenue south, and at Park Lane, Garden Drive, and Fairlawn Street.

2.1.5.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.1.5.5 Critical Facilities

Milton Point Fire Station is located on Milton Road at Garden Drive and relies on Milton Road and Oakland Beach Avenue for operation; both these roads are within the base floodplain and can be flooded during severe storm events with coastal influence. In the event of flooding, the Fire Chief relocates emergency trucks and vehicles to other locations in the City.

2.1.5.6 Flood Control/Stormwater Management Facilities

There are no flood control facilities along this stream segment.

2.1.5.7 Riparian Character/Significant Natural Resources

Flow within the brook from Oakland Beach Avenue south is strongly influenced by tides. The channel varies from 40-100 feet wide and is lined on both sides by reeds and grasses up to the edges of residential developments. South of Dearborn Avenue, the east bank is bordered by high, intertidal and shallow marsh wetlands.

The Milltown area, which extends from Oakland Beach Avenue south to the end of Milton Road east of the brook, is recognized as a site of local or national register significance in the 1985 Development Plan.

2.1.5.8 Development Trends in the Floodplain and Natural Resource Areas

No new development is anticipated from Oakland Beach Avenue south to Milton Harbor. The Nichols Marina identified for acquisition in the 1985 Development Plan was subdivided for residential housing in the early 1990's; these structures were elevated to accommodate coastal flooding. The City has applied for grants to acquire the Friends Meeting House property east of the brook on Milton Road at Everett Street.

Beaver Swamp Brook

2.2.1 Rye City/Town of Harrison Corporate Line to Theodore Fremd Avenue

2.2.1.1 Mapped Floodplains

The northernmost reach of Beaver Swamp Brook within the incorporated city limits runs from the Rye City/Harrison Line south to Theodore Fremd Avenue (Figure 2.9). From

City of Rye Flood Mitigation Plan

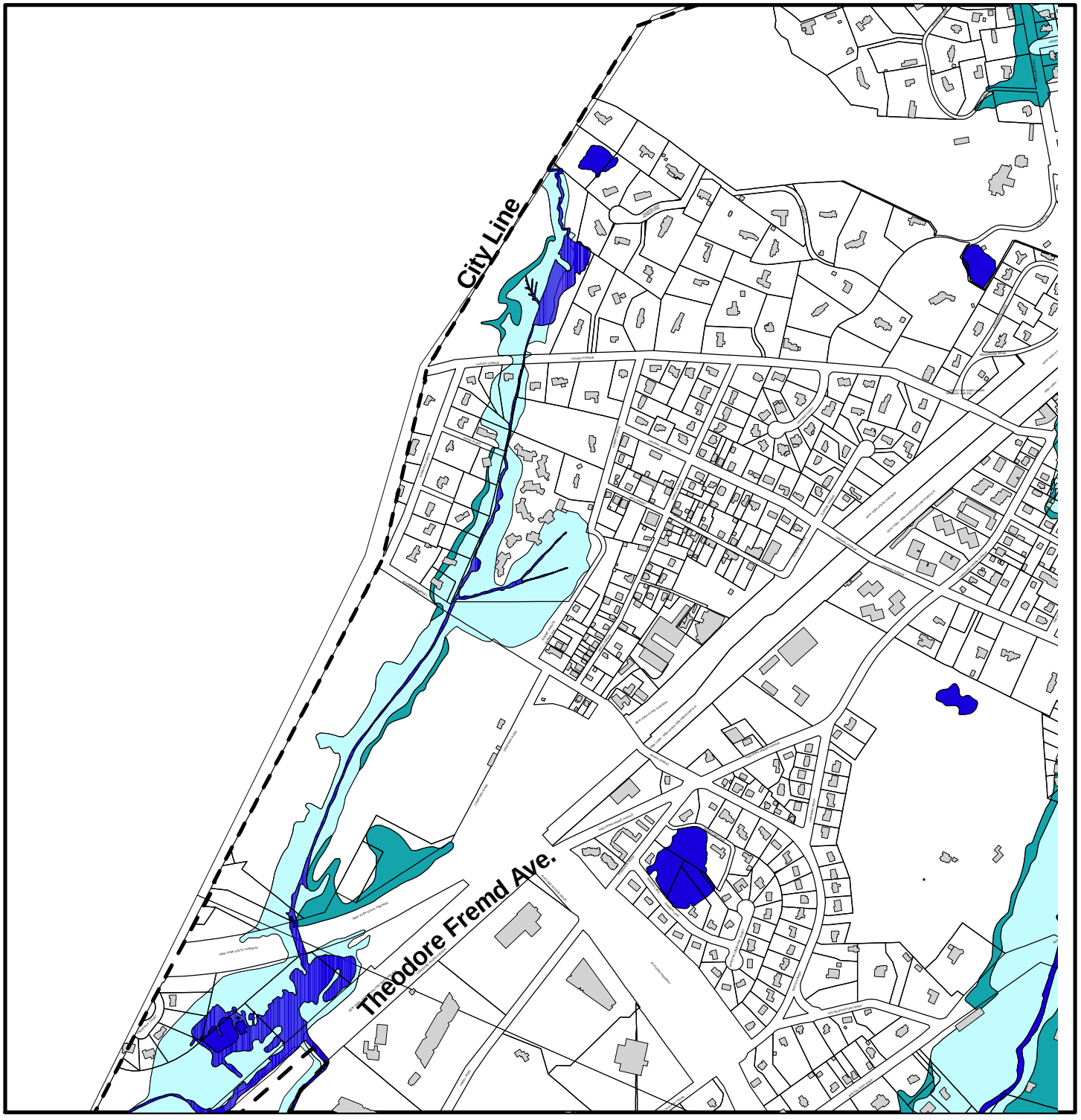
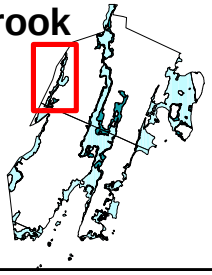


Figure 2.9:

FEMA Floodplains - Harrison line to Theodore Fremd Ave.

Beaver Swamp Brook

City Line (approx.)
Buildings
Property Boundaries
Water/Streams
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

the City line to Locust Avenue, the segment is occupied by the Apawamis Golf and Country Club and undeveloped land. From Locust Avenue to North Street, land use is single-family residential. From North Street to I-95, the segment is occupied by the Greenwood Union Cemetery and a townhouse development known as "The Ives." Between I-95 and Theodore Fremd Avenue, the Parcels A and B wetland is owned by the City and main-tained as a wildlife preserve.

From the City line to Locust Avenue, the 100-year floodplain varies in width from 60-150 feet; in this area, the brook flows through two ponds constructed for golf course use. The floodplain narrows to less than 40 feet at the Locust Avenue Bridge and increases to 650 feet north of North Street; the increase at North Street is due to an unnamed tributary that rises south of High Street and joins the main stem of the brook at this point. From North Street south to the I-95 Thruway, the floodplain width varies from 100-200 feet. Between the thruway and Theodore Fremd Avenue, the brook flows through a New York State wetland (City-owned Parcels A and B); the floodplain in this area widens to 1600 feet.

The 500-year floodplain (Zone B) for this segment extends only an additional 30-40 feet west of the base floodplain between the City line and North Street. Between North Street and I-95, Zone B extends an additional 30-40 feet west of the base floodplain, and expands significantly (to 1000 feet) at the Thruway.

Between the City line and Locust Avenue, the floodway ranges 40-100 feet in width; from Locust Avenue south, the floodway widens to 360 feet at North Street. South of North Street, it narrows to 20 feet, widening to 45 feet north of the thruway and 62 feet immediately south of the Thruway culvert (at Parcels A and B).

Base flood elevations from the City line to Locust Avenue range from 47.5 to 43.75 feet NGVD; corresponding streambed elevations are 42 and 39 feet, a drop of 3 feet over approximately 1200 feet of stream. Base flood elevations below Locust Avenue to North Street range from 43 to 39.5 feet; corresponding stream bed datum are 39 and 33.75 feet, a drop of 5.25 feet over 1525 feet of stream. Base flood elevations below North Street to I-95 range from 41 to 40 feet with corresponding stream bed elevations of 33.8 and 32.5, a change in elevation of 1.3 feet over 2000 feet of stream. From I-95 through Parcels A and B the base flood elevation is constant at 40 feet; the streambed elevation in this area drops 2.5 feet (from 34 to 31.5 NGVD) over a horizontal distance of 625 feet.

2.2.1.2 Flood Insurance Claims

No property owner along this segment has filed more than a single claim.

2.2.1.3 Flooding Problems

Drainage problems and ponding occur north of North Street and west of the bridge during the 20-year and higher intensity storm events.

2.2.1.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers. In

addition, the stormwater management plan for Beaver Swamp Brook[33] identified a hydraulic constriction at the North Street bridge crossing.

2.2.1.5 Critical Facilities

There are no critical facilities along this segment.

2.2.1.6 Flood Control/Stormwater Management Facilities

A dry detention basin that is maintained as a wetland, one of the 11 detention basins constructed in accordance with City surface water management regulations, is located at "The Ives" development on North Street. The 1986 "Comprehensive Stormwater Management Plan for Beaver Swamp Brook Watershed," prepared for the City by Satterthwaite Associates of Westchester, PA, recommended this approximate location for a detention facility to address the backwater condition created by the hydraulic constriction at the North Street culvert; however, work done for development of "The Ives" did not convert the North Street structure to provide greater flow attenuation to reduce downstream surcharge flows.[34]

2.2.1.7 Riparian Character/Significant Natural Resources

From the City line to Locust Avenue the riparian area is a mixture of woody vegetation and turf grass for golf purposes. South of Locust Avenue, the riparian area varies from 25-100 feet and is in residential lawn and landscaping. Further south, it narrows to less than 25 feet with significant wooded areas associated with adjacent commercial uses. South of I-95, the channel flows through the 7.5-acre Parcels A and B wildlife preserve owned by the City. It is a Class II wetland pursuant to the New York State freshwater wetland law (Article 24).

2.2.1.8 Development Trends in the Floodplain and Natural Resource Areas

No specific development or redevelopment is anticipated along this segment.

2.2.2 Theodore Fremd Avenue to Osborn Road

2.2.2.1 Mapped Floodplains

From Theodore Fremd Avenue to Osborn Road, the brook flows through predominantly office/commercial development; the brook also forms the Rye City/Town of Harrison corporate line (Figure 2.10). The 100-year floodplain in this area extends 40-120 feet east of the brook with only a small section including a 50-foot strip of 500-year floodplain. The floodway in this stretch varies from 24 to 54 feet in width and extends beyond City limits into the Town of Harrison. The base flood elevation ranges from 39.8 to 35.4 feet with corresponding stream bed elevations of 33.5 and 29.5 feet, a drop of 4 feet over 1485 feet of stream.

[33] 1986. Walter B. Satterthwaite Associates. Comprehensive Stormwater Management Plan for Beaver Swamp Brook Watershed. 72 pp.

[34] During the 100-year storm, the proposed facility would reduce the flow through the culvert by an additional 90 cfs.

City of Rye Flood Mitigation Plan

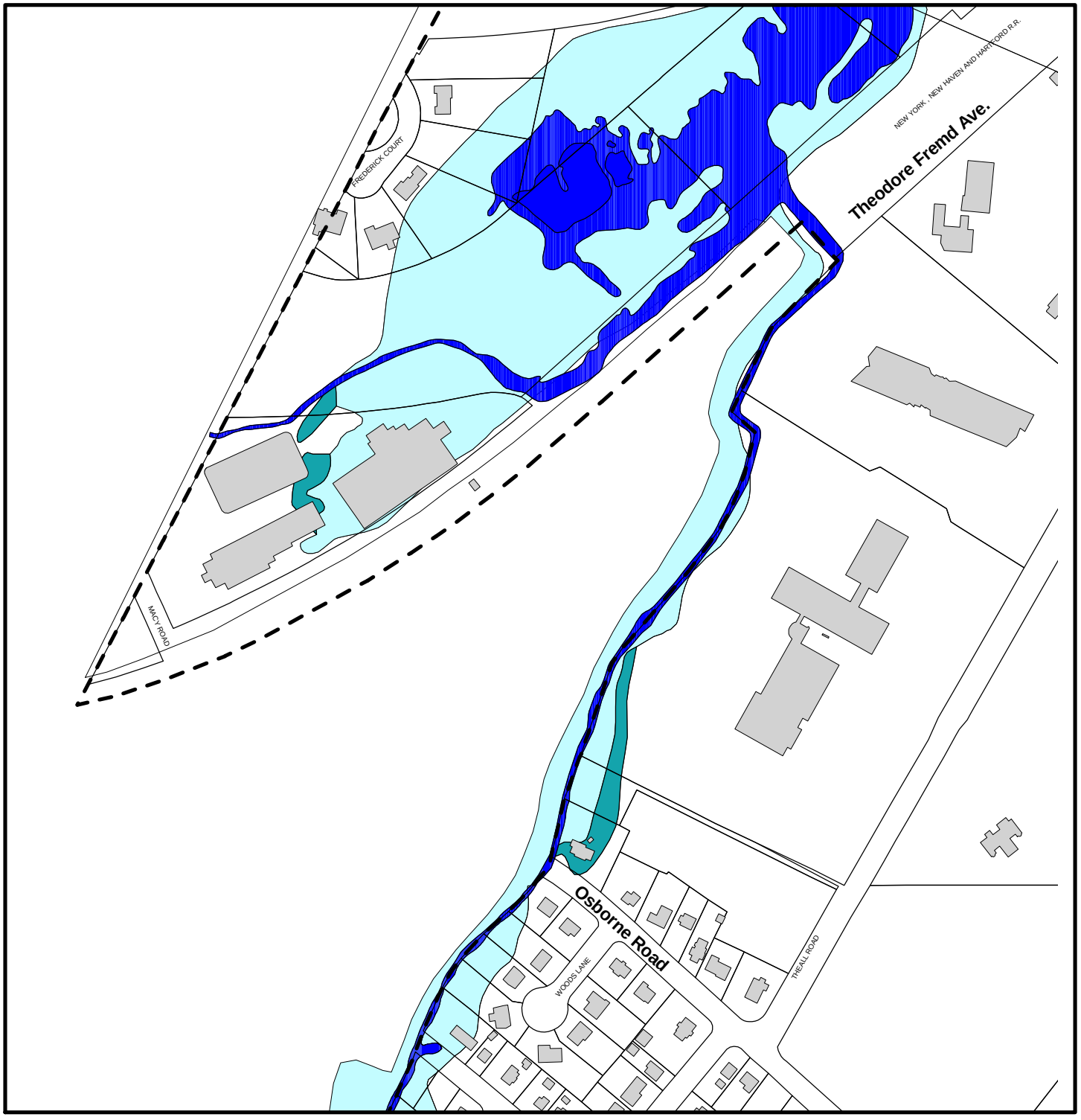


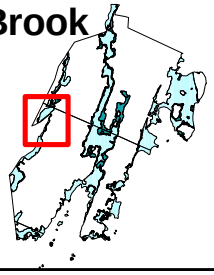
Figure 2.10:

FEMA Floodplains - Theodore Fremd Ave. to Osborn Road

Beaver Swamp Brook

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



N

Source: City of Rye, New York Geogrpahic Information System

Note: This map is intended for general planning purposes only.

2.2.2.2 Flood Insurance Claims

There have been no repetitive claims filed by property owners along this segment of Beaver Swamp Brook.

2.2.2.3 Flooding Problems

Since the brook primarily flows through corporate office campus developments in this segment few drainage problems have been reported; however, because of excess siltation that constricts bridge openings, one residence is flooded at the Osborn Road crossing.

2.2.2.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.2.2.5 Critical Facilities

There are no critical facilities along this segment.

2.2.2.6 Flood Control/Stormwater Management Facilities

Two dry detention basins have been constructed in association with the Senior Citizen Housing facility and Gateside Office Development, both on Theall Road; a third is sited at the northeast corner of Osborn and Theall roads. All three of these basins comply with City surface water management regulations.

2.2.2.7 Riparian Character/Significant Natural Resources

The brook channel in this segment is approximately 6 feet wide and is stone-lined immediately south of Theodore Fremd Avenue. The riparian area is generally less than 25 feet wide, sparsely wooded in the upper section, and maintained as lawn through the corporate office park.

2.2.2.8 Development Trends in the Floodplain and Natural Resource Areas

No specific development or redevelopment is anticipated along this segment.

2.2.3 Osborn Road to Bradford Avenue

2.2.3.1 Mapped Floodplains

This segment of brook defines the Rye City/Harrison corporate line and flows through residential neighborhoods (Figure 2.11). The 100-year floodplain varies in width from 40-400 feet and coincides with the 500-year floodplain throughout. The floodway varies from 24 feet south of Osborn Road to 72-75 feet at Bradford Avenue. Base flood elevations in this segment range from 34.1 feet south of Osborn Road at Woods Lane to 33.7 feet north of Bradford Avenue; corresponding stream bed elevations are 29 and 27.5 feet, a drop of 1.5 feet over 1950 feet of stream. Properties within the base

City of Rye Flood Mitigation Plan

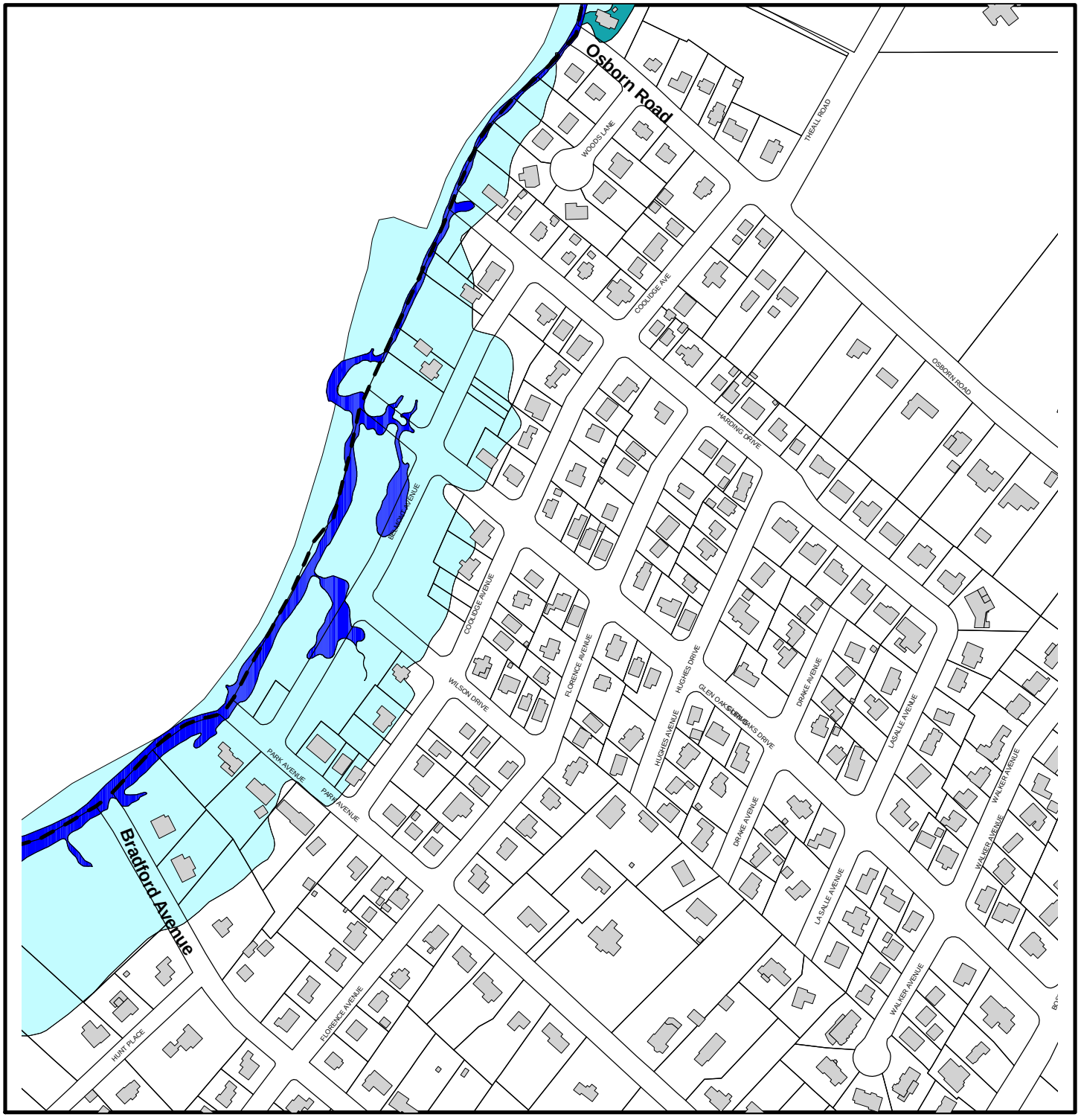


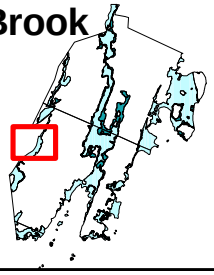
Figure 2.11:

FEMA Floodplains - Osborn Road to Bradford Avenue

Beaver Swamp Brook

City Line (approx.)
Buildings
Property Boundaries
Water/Streams

FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

floodplain include those along Woods Lane, at the end of Harding Drive, along Belmont and Coolidge avenues, and on Park and Bradford avenues.

2.2.3.2 Flood Insurance Claims

Flood insurance claims have been filed more than once by property owners on LaSalle Avenue, Wilson Drive and Florence Avenue.[35] These claims make up 4% of the repetitive filings in the City.

2.2.3.3 Flooding Problems

During more severe storm events (10-year and less frequent), ponding occurs at the Park and Bradford bridge crossings due to severely constricted bridge openings. Roadway ponding also occurs along Belmont and Coolidge avenues, at Wilson Drive, along Florence Avenue, at the dead-end of Glen Oaks and along Park Avenue.

2.2.3.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.2.3.5 Critical Facilities

The County owns and operates a sewage pump station at the intersection of Glen Oaks and Belmont; no flood-related problems have been reported for this facility.

2.2.3.6 Flood Control/Stormwater Management Facilities

There are no flood control or stormwater management facilities along this segment.

2.2.3.7 Riparian Character/Significant Natural Resources

The riparian area through this segment is residential lawn and landscaping; in most areas it is less than 25 feet wide. New York State freshwater wetland J-3 (Class II) occupies most of this segment, extending from Woods Lane to south of Park Avenue. This wetland is the subject of an intermunicipal restoration effort being undertaken by the City and the Town of Harrison.

2.2.3.8 Development Trends in the Floodplain and Natural Resource Areas

No new development is anticipated in the floodplain of this segment. State and Federal grant monies have been secured to restore New York State wetland J-3; this effort is expected to improve water quality, enhance public use of the area for passive recreation, and help mitigate flood flows by expanding floodplain storage.

[35] The claim at LaSalle Avenue is a localized drainage problem having nothing to do with the brook.

City of Rye Flood Mitigation Plan

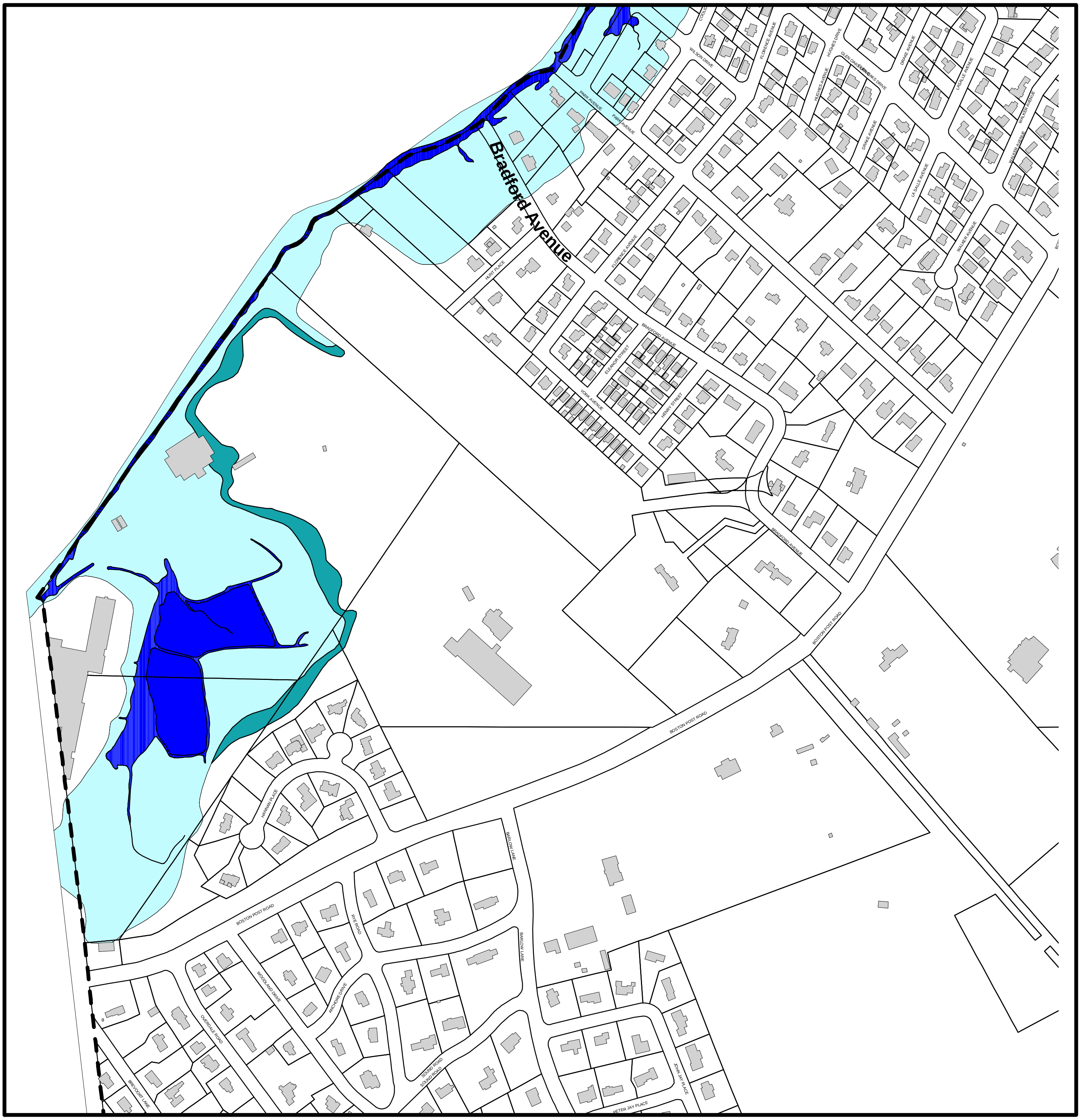
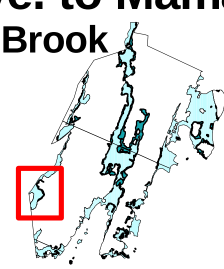


Figure 2.12:

FEMA Floodplains - Bradford Ave. to Mamaroneck Line

Beaver Swamp Brook

City Line (approx.)
Buildings
Property Boundaries
Water/Streams
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

2.2.4 Bradford Avenue to the Rye City/Mamaroneck Village Corporate Line

2.2.4.1 Mapped Floodplains

This segment of the brook continues to define the Rye City/Harrison corporate limit, ending at the Rye City/Harrison/Mamaroneck Village Corporate limit (Figure 2.12). Dominant land use along this section is single-family residential and institutional (Rye Neck School).

The 100-year floodplain in this area varies in width from 360 feet (east of the brook) at the Bradford Avenue crossing, to 40 feet at the Rye Neck property, to more than 1200 feet at the Mamaroneck line. The 500-year floodplain extends 40-80 feet east of the base floodplain at through most of the school property. The floodway extends west beyond the corporate limits and varies from 60 feet south of Bradford Avenue to 112 feet at the Rye/Harrison/Mamaroneck line.

The base flood elevation in this segment varies from 33.4 feet south of Bradford Avenue to 31.8 feet at the tri-corporate line; corresponding stream bed elevations are 27.5 and 26 feet, a drop of 1.5 feet over 2375 feet of stream. Properties along Hunt Place and three at “The Preserve” are within the base floodplain.

2.2.4.2 Flood Insurance Claims

No property owner along this segment has filed more than a single claim.

2.2.4.3 Flooding Problems

Flooding occurs at the Bradford Avenue footbridge and roadway during the 10-year and lower frequency storm events.

2.2.4.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.2.4.5 Critical Facilities

There are no critical facilities associated with this segment.

2.2.4.6 Flood Control/Stormwater Management Facilities

A polishing detention basin was constructed at “The Preserve” at Johnson Place to provide water quality remediation for site runoff; no flood control facilities were installed.

2.2.4.7 Riparian Character/Significant Natural Resources

The riparian area in this segment is in woody vegetation and residential lawn associated with single-family homes located along the floodplain; it averages 20-40 feet

in width. New York State wetland J-1 (Class II) occupies the Rye Neck School property.

2.2.4.8 Development Trends in the Floodplain and Natural Resource Areas

In 1996, the former Sloan-Kettering research facility property on the Boston Post Road south of Bradford Avenue was subdivided into 38 single-family lots. This property, now known as "The Preserve," was one of the last large under-developed parcels in the city. With the exception of possible future expansion of the Rye Neck School if enrollments increase, no new significant development is anticipated in this segment of Beaver Swamp Brook.

2.3 The Coastal Sub-basins

Flooding in the coastal sub-basins is influenced by interior watercourses but is dominated by Long Island Sound. Special Flood Hazard Areas have been mapped by the Federal Flood Insurance Administration for all of the coastal sub-basins within the City. These "V" zones identify areas along the coast that are inundated by the 100-year flood and carry additional hazards due to velocity (wave action). Wave heights were analyzed by FEMA in 1984 for the Rye City coastline at various intervals reflecting the physical and cultural characteristics of the land. Six transects were established at close intervals in areas of complex topography and dense development, and at larger intervals in areas with more uniform characteristics. Maximum wave crest elevations were calculated along these transects and used to define the V Zones. The V Zone generally extends inland to where the 100-year flood depth is insufficient to support a 3-foot breaking wave.

Zones A, B and C also are mapped within the coastal areas, as previously defined.

2.3.1 Port Chester Harbor Coastal Sub-basin

The Port Chester Harbor Coastal Sub-basin extends from the Rye City/Port Chester Corporate Line to approximately Kirby Lane south (Figure 2.13).

2.3.1.1 Mapped Floodplains

Within this sub-basin, Zone V8 (base flood elevation 19) extends landward from the City corporate limit at Long Island Sound to include 10-35 feet of the east shore of North Manursing Island. Fifteen to seventy (15-70) feet of the north shore of North Manursing Island are included within Zone V8 (elevation 18). The western edge of North Manursing Island is mapped as Zone V8 (elevation 13); the affected area includes 10-40 feet of the shoreline, widening to 400 feet at West Island Drive.

From the Rye/Port Chester Corporate Line south to Kirby Lane, the V8 and A8 zones range from elevation 17 to 14; the amount of shoreline affected ranges from 40-160 feet and includes most of the peninsula northeast of Kirby Pond. All of Kirby Lane from the mainland to Island Drive is in Zone A8.

All of the shoreline within this coastal sub-basin, except that within the harbor itself, is considered a coastal erosion hazard area under the New York State Coastal Erosion Hazard Program.

City of Rye Flood Mitigation Plan

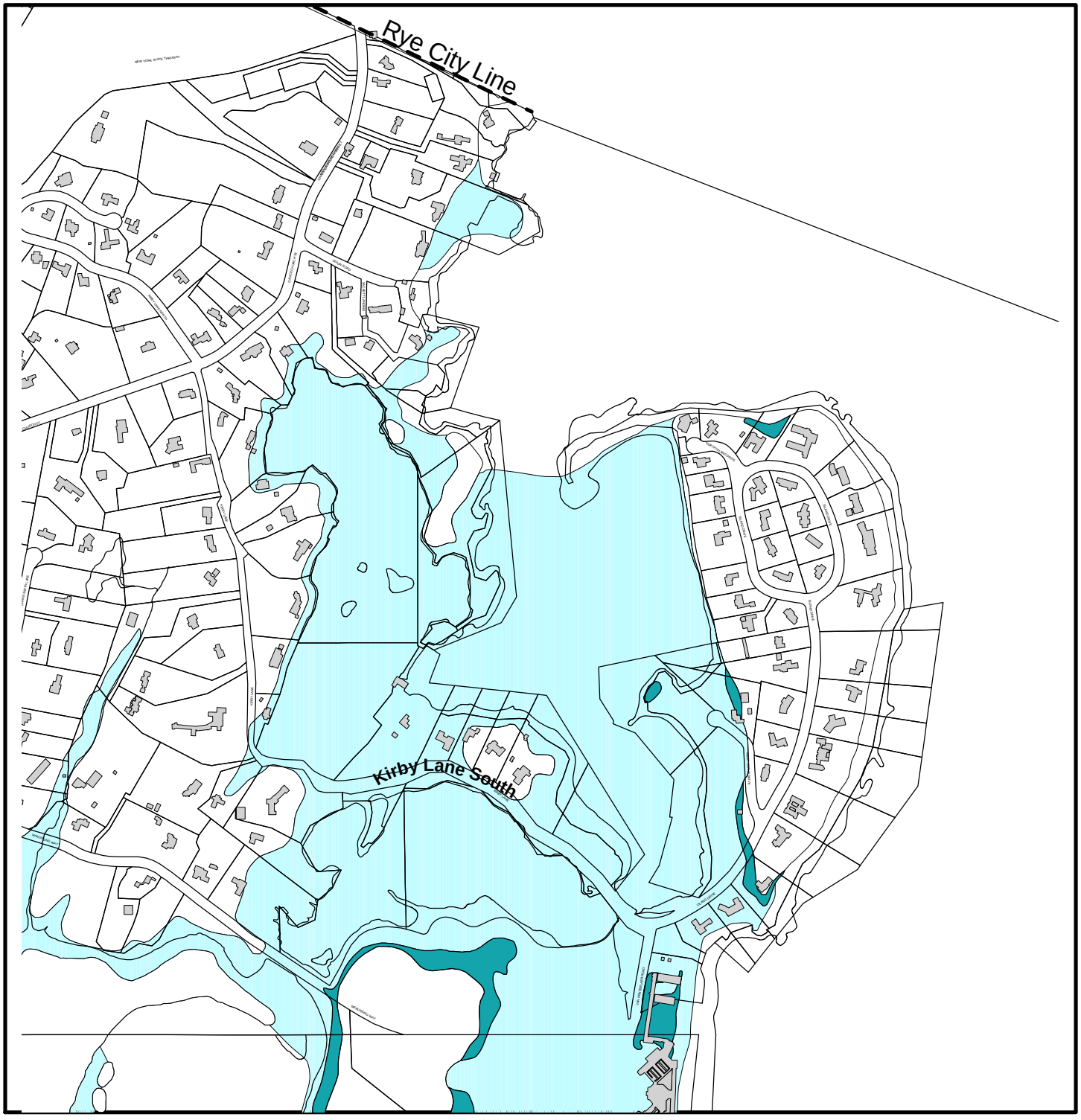
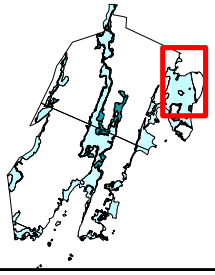


Figure 2.13:

FEMA Floodplains - Port Chester Harbor Coastal Sub-basin

City Line (approx.)
Buildings
Property Boundaries
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

2.3.1.2 Flood Insurance Claims

Repeat claims have been filed by property owners west of Grace Church Street at Guion Road, on Kirby Lane, and on North Manursing Island. These claims represent 3% of all filings in the City.

2.3.1.3 Flooding Problems

Drainage problems occur along Kirby Lane from the mainland to Island Drive on North Manursing Island. During the 10-year storm and lower frequency events, access to North Manursing Island and Manursing Island is severed.

2.3.1.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers. Residences on North Manursing Island are not sewered and rely on septic systems; however, no flood-related failures of these systems have been reported.

2.3.1.5 Critical Facilities

The City owns and operates a sewage pump station on Van Rensselaer Road that serves the Westchester Country Club Beach Club, Manursing Island Club, and 68 residences on South Manursing Island; no flood-related problems have been reported for this facility.

2.3.1.6 Flood Control/Stormwater Management Facilities

Three stormwater detention basins (2 dry, 1 wet) have been constructed in the inland reaches of this sub-basin. A dry basin is located at the Marriott Courtyard Hotel on Midland Avenue north of I287; two additional basins are located east and west of Midland Avenue, at The Gables townhouse development and at IBM Credit Corporation. All were constructed pursuant to the City's surface water management regulations.

2.3.1.7 Coastal Character/Significant Natural Resources

Sections of the shoreline from the Port Chester line south are classified by the State as tidal wetlands; these include mudflats at Guion Road, north of Kirby Pond, and along the shores of North Manursing Island, including the Kirby Lane causeway; high marsh along the north shore of Kirby Pond; and littoral zones at Kirby Pond and within Port Chester Harbor. These areas are protected under the New York State Tidal Wetlands Act (Article 25) and in accordance with the City of Rye wetlands and watercourses law.

According to the 1985 Development Plan, the Kirby Mill on Kirby Mill Pond is a site of local historic significance.

City of Rye Flood Mitigation Plan

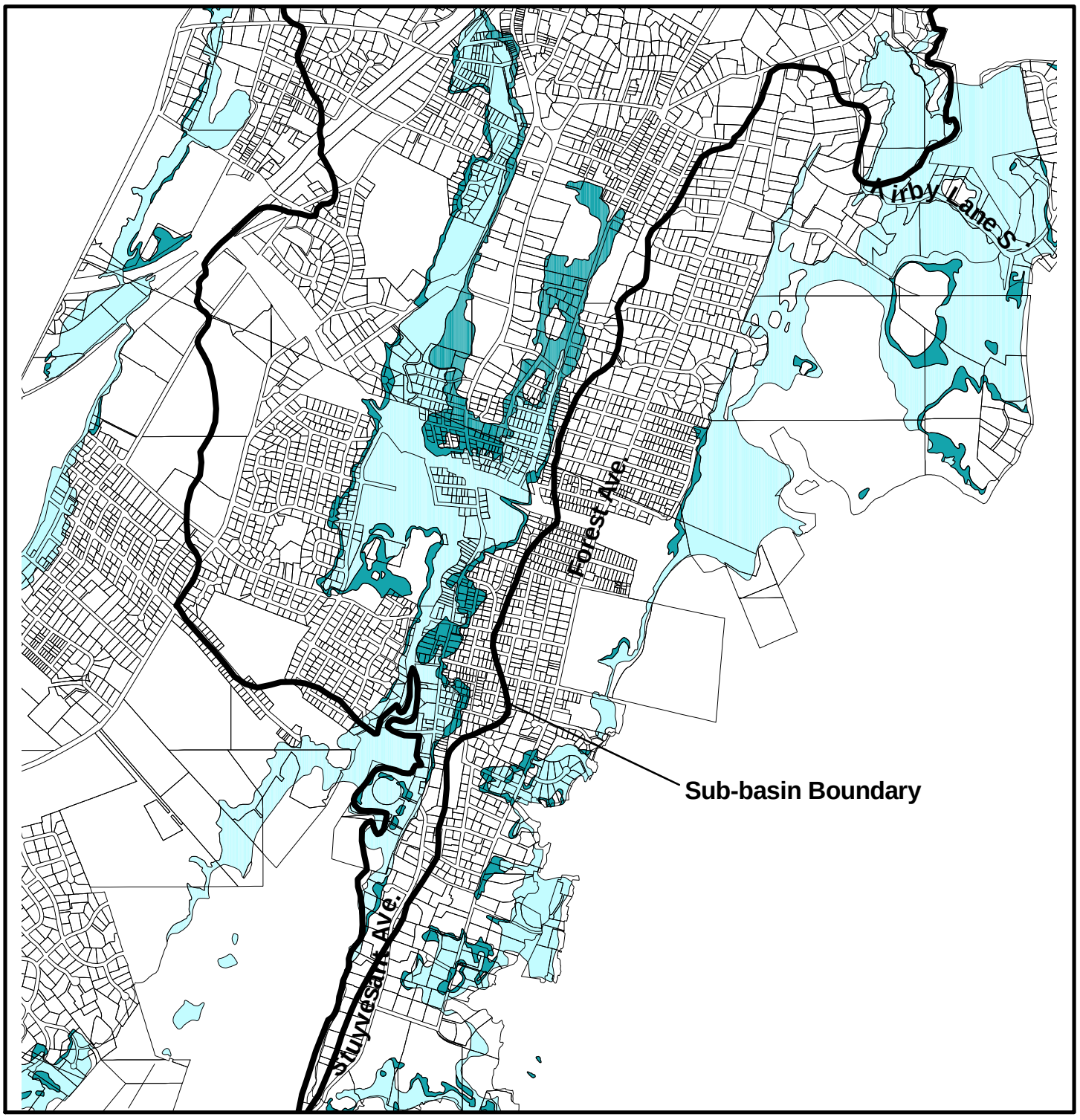
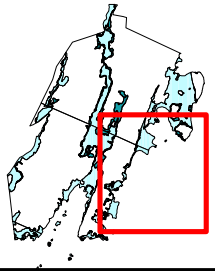


Figure 2.14:

FEMA Floodplains - Long Island Sound Coastal Sub-basin

City Line (approx.)
Buildings
Property Boundaries
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

2.3.1.8 Development Trends in the Coastal Floodplain and Natural Resource Areas

While there are no large undeveloped parcels remaining in this sub-basin, future development could occur through the subdivision of larger lots. In addition, existing lot coverages may increase given the current trend toward significantly larger homes.

2.3.2 Long Island Sound Coastal Sub-basin

The Long Island Sound Coastal Sub-basin extends approximately from Kirby Lane south and west to Stuyvesant Avenue (Figure 2.14).

2.3.2.1 Mapped Floodplains

Manursing Island/Playland Area

120-160 feet of the eastern shore of Manursing Island is within the V8 Zone with flood elevations ranging from 14-18 feet; all of Playland Lake and the southeast shore of Manursing Island are within the V8 Zone (elevations 15-18). The 100-year floodplain (not influenced by waves) extends inland to 700 feet east of Forest Avenue. Properties partially or entirely within the floodplain include the Westchester Country Beach Club, Manursing Island Club, and all of the County Playland Park. Critical sections of Manursing Way and associated access roads are within the floodplain and truncate access to the island during the 50-year or more severe storm events. The coastline in this area, except the area within the harbor itself and associated with Playland Lake, is classified "high erosion hazard" under the New York State Coastal Erosion Hazard Program.

Peningo Neck

From Playland Park south to Milton Point, the entire coastline, to varying landward extent, is within the V8 Zone. In the vicinity of Playland Beach and Rye Town Park, the V8 Zone extends inland 80-400 feet with flood elevations ranging from 18 to 12 feet NGVD. Dearborn Avenue at and including lower Cornell Place are included within this zone.

From Cornell Place south to Pine Lane, the immediate coastal shore is within Zone V8 (elevation 18); the stillwater 100-year floodplain (Zone A) affects more inland areas including Philips Lane, Hewlett Avenue west and east of Forest Avenue, and most of Pine Island Road.

From Pine Island Road south to Milton Point, Zone V8 extends inland 20-160 feet; Zone A affects areas further inland. Included within these zones are all of Warriston Lane, Magnolia Place west of Forest Avenue, Forest Avenue from Warriston to Magnolia, the lower end of Fords Lane and Mlton Point Lane, and all of Stuyvesant Avenue and Milton Point south of the Coveleigh Club.

The coastline in this area is classified as high erosion hazard by the New York State Coastal Erosion Hazard Program.

2.3.2.2 Flood Insurance Claims

Repeat claims have been made by property owners on Van Rensselaer Road on South Manursing Island, Philips Lane, Pine Island Road, Forest Avenue between Magnolia Place and Van Wagenen Road, Milton Point Road, and Stuyvesant Road on Milton Point; these represent 12% of property owners filing repeat claims in the City.

2.3.2.3 Flooding Problems

Drainage problems occur at most of the locations noted within the V8 and A zones. During severe storms, and lesser storms with coastal wave action, Warriston Lane and Magnolia Place are flooded, and access to homes on Pine Island Road and to the Durland Scout Center, Shenorock Shore Club, and American Yacht Club on Milton Point, is cut off.

2.3.2.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.3.2.5 Critical Facilities

The City operates two sewage pump stations in this sub-basin, one at the end of Dearborn Road at the Water's Edge development, and another on Forest Avenue at Hewlett Avenue. No problems associated with flooding have been reported for these facilities.

2.3.2.6 Flood Control/Stormwater Management Facilities

One wet stormwater detention basin has been constructed on Bird Lane but serves no flood control function. Westchester County has rebuilt a breakwater at Playland Park that provides significant wave attenuation for this area.

2.3.2.7 Coastal Character/Significant Natural Resources

The shoreline in this coastal sub-basin has been modified in the Playland Park and Rye Town Park areas to construct the beaches and Playland Pier. Property owners have also constructed shoreline protection along Forest Avenue between Valleyview and Hewlett Avenue. The remainder of the coastline south of Rye Town Park is residential in use.

Much of the shoreline in this sub-basin that is not hardened consists of tidal wetlands that are regulated by the State and City. These habitats include coastal shoals, bars, and mudflats, intertidal marsh, and high marsh. This sub-basin also includes the Edith G. Read Nature Preserve that borders and includes Playland Lake and is part of the County's Playland Park.

Playland Amusement Park is listed on the National Register of Historic Places. Sound View Park between Apawamis Avenue and Orchard Lane along Forest Avenue has been proposed as a National Register District. Other sites of local or national register significance within this sub-basin include the Rye Town Park.

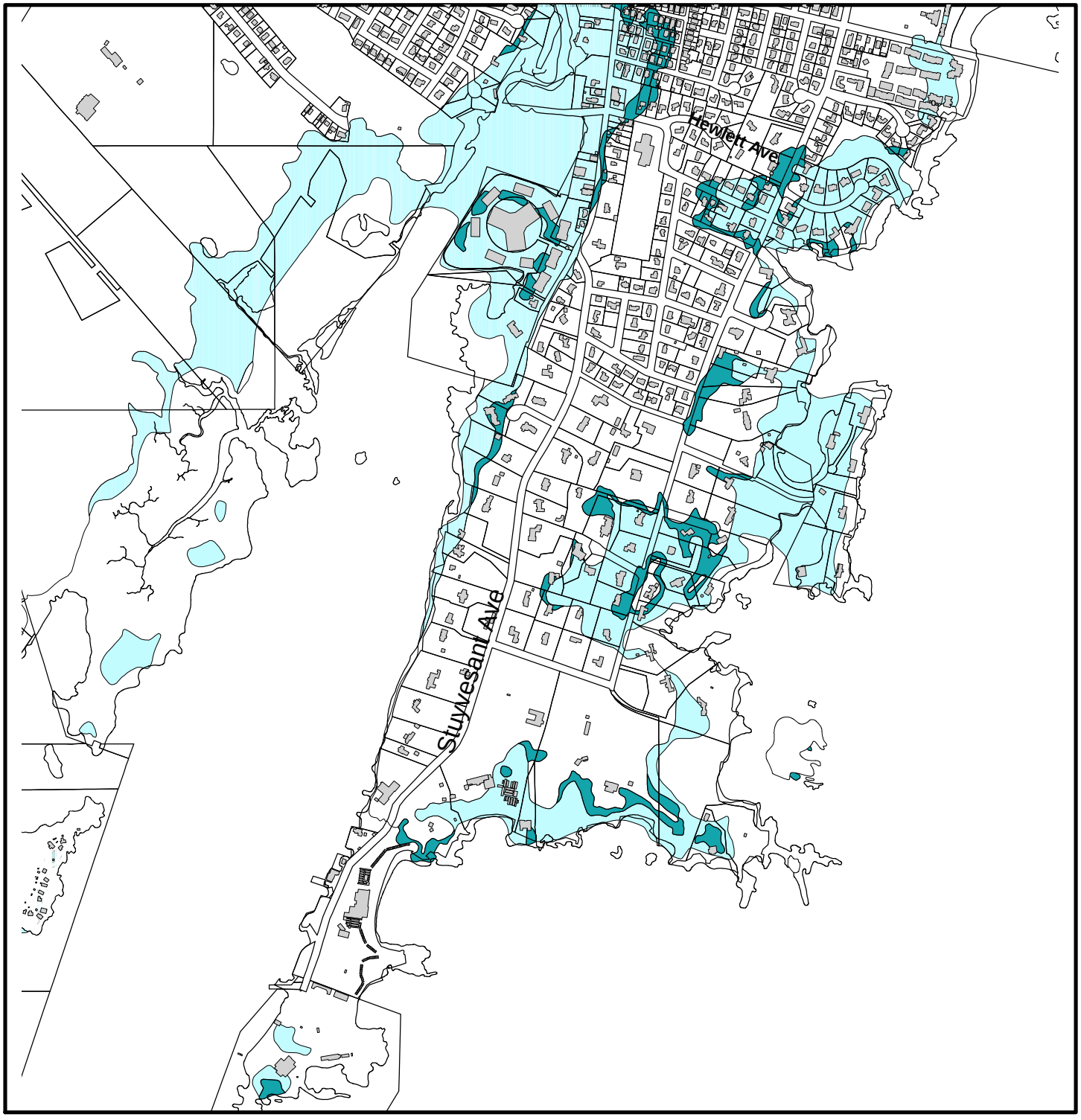
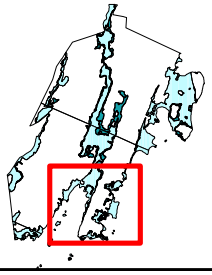


Figure 2.15:

FEMA Floodplains - Milton Harbor Coastal Sub-basin

City Line (approx.)
Buildings
Property Boundaries
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



N

Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

2.3.2.8 Development Trends in the Floodplain and Natural Resource Areas

Since the 1985 Development Plan, additional development has occurred in this sub-basin, notably at Parsonage Point (15 single-family residential lots), and through large-lot subdivisions. Sale and redevelopment of the shore dubs at Milton Point is a possibility anticipated by the 1991 Local Waterfront Revitalization Plan.

2.3.3 Milton Harbor Coastal Sub-basin

2.3.3.1 Mapped Floodplains

Milton Harbor East

This area is approximately bounded by Hewlett Avenue on the north, Stuyvesant Avenue on the east; it extends south to include Milton Point (Figure 2.15). The 100-year floodplain extends inland to include the Rye Boat Basin (City Marina), Milton Road and Milton Harbor House. South of the Harbor House, Zone V9 (base flood elevations 15-17 feet) extends inland 880 feet; south of Coveleigh Country Club, all of Milton Point is located within zones A, B or V.

Milton Harbor West

This area is approximately bounded by Helen Avenue on the north and extends south to include most of Marshlands Conservancy. On average, the 100-year floodplain extends inland 800-900 feet along most of the shore in this area and includes all of Maries Neck. Base flood elevations range from 17 feet in the harbor to 13 feet at the landward edge of the A and V zones. Properties within the floodplain include those at Watson Court and the easternmost end of Soundview and Hix avenues; the homes on Watson Court have been elevated and do not flood.

The coastline in this area, with the exception of the Harbor, is classified “high erosion hazard” under the New York State Coastal Erosion Hazard Program.

2.3.3.2 Flood Insurance Claims

Repeat claims have been filed by property owners at Milton Harbor House, west of Stuyvesant Avenue south of Barron Lane, and at Soundview Avenue;[36] these represent 9% of the property owners in the City who have filed more than one flood insurance claim.

2.3.3.3 Flooding Problems

Milton Road south from Hewlett Avenue floods during severe storm events.

2.3.3.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

[36] The flooding at the single-family residence is not coastal flooding.

2.3.3.5 Critical Facilities

The City owns and operates a sewage pump station at the Durland Scout Center on Stuyvesant Avenue; during flood events, the City cuts the power to this station.

2.3.3.6 Flood Control/Stormwater Management Facilities

There are no flood control or stormwater management facilities in this segment.

2.3.3.7 Coastal Character/Significant Natural Resources

The east shore of Milton Harbor is occupied by the City marina and a condominium-townhouse development; further south, the shore consists of tidal flats and intertidal marsh. The west shore of Milton Harbor is nearly continuous tidal wetland, including high marsh, intertidal marsh and mud flats. These wetlands are significant along the Rye Golf Club and Marshlands Conservancy properties.

The area from Allendale Drive south and including Marshlands Conservancy is listed on the National Register of Historic Places as the Boston Post Road District. Other sites of national or local historic significance include the Milltown area that extends from Oakland Beach Avenue to the end of Milton Road west to the brook, but excludes the Milton Harbor House.

2.3.3.8 Development Trends in the Floodplain and Natural Resource Areas

The largest undeveloped parcels in this sub-basin are the Coveleigh, Shenorock and American Yacht Club properties at Milton Point, and the Rye City Golf Club and County Marshlands Conservancy, both on Boston Post Road. Any redevelopment of the shore clubs would be required to comply with the policies adopted by the City in its 1991 LWRP; the City is re-examining those policies for adequacy. The City Golf Club recently was redeveloped to improve an existing pool complex and Whitby Castle, the restaurant facility at the site; no additional development of this property is planned. The County of Westchester owns and manages the Marshlands Conservancy; however, the County Board of Legislators acted in 1996 to preclude significant future development at this site, and any proposed non-parkland use would require approval by the New York State Legislature.

2.3.4 Mamaroneck Harbor Coastal Sub-basin

2.3.4.1 Mapped Floodplains

This sub-basin includes the western third of Marshlands Conservancy, the portion of Greenhaven (a neighborhood of single-family residences) in the City of Rye, and Hen Island (Figure 2.16). The 100-year floodplain in this area (zones A, V8 and V9) extends inland 40-800 feet and includes all of Hen Island.[37] Coastal portions of Greenhaven, including Greenhaven and Rye roads, Norman Place, upper and lower Brevoort Lane and Shore Road, are within the base floodplain. Base flood elevations range from 15 feet at the coast to 13 feet at the inland edge of the floodplain. Hen Island is privately owned and occupied by 35 summer residences. These structures are not served by

[37] Two small high spots on Hen Island are Zone C.

City of Rye Flood Mitigation Plan

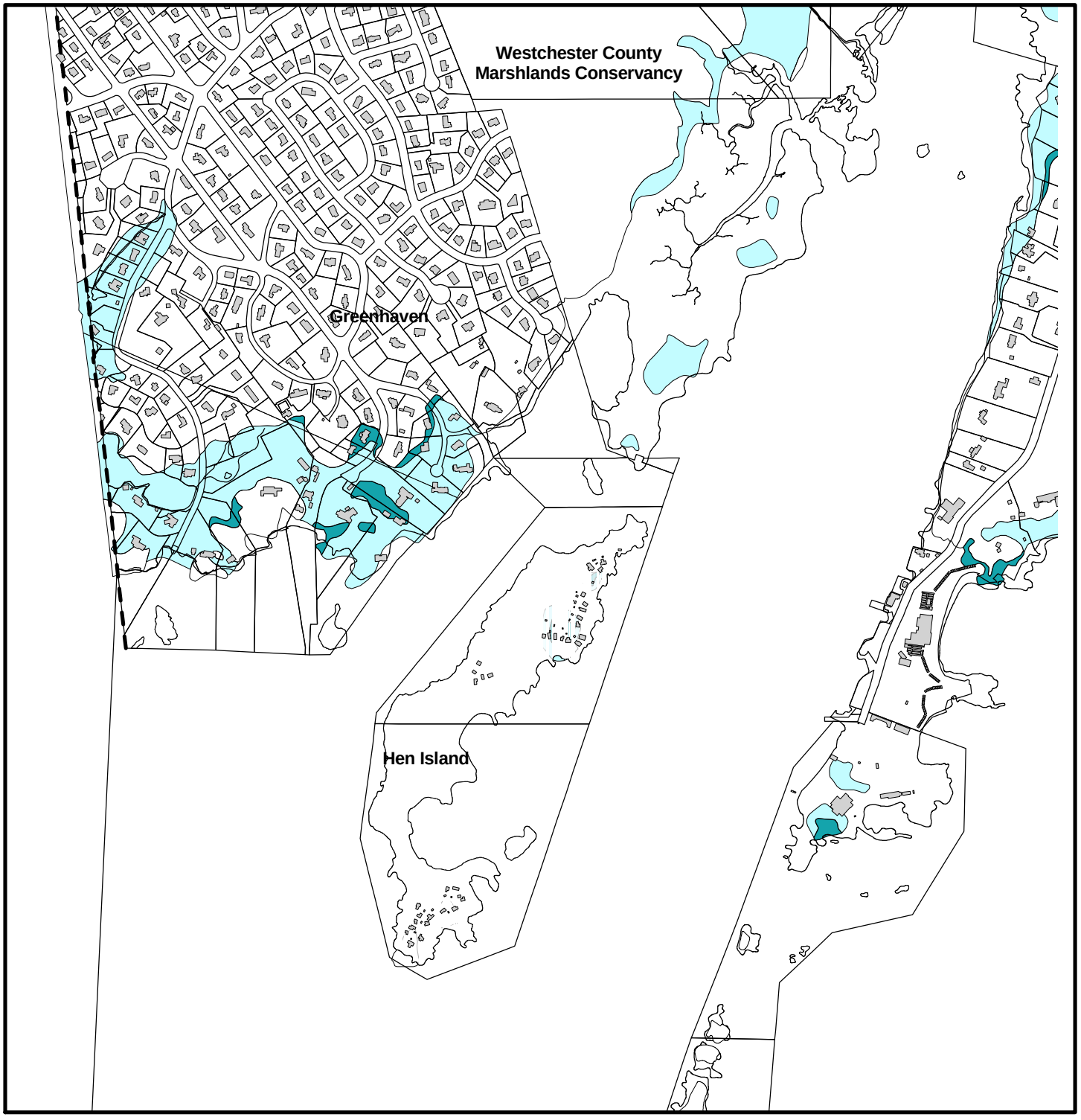
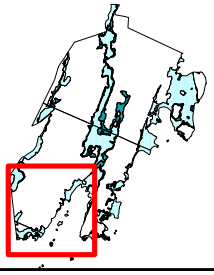


Figure 2.16:

FEMA Floodplains - Mamaroneck Harbor Coastal Sub-Basin

City Line (approx.)
Buildings
Property Boundaries
FEMA Flood Plains
100-year floodplain (Zone A)
500-year floodplain (Zone B)
Outside 100-/500-year Floodplain (Zone C)



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Source: City of Rye, New York Geographic Information System

Note: This map is intended for general planning purposes only.

water, sewer or electricity and are cut off from the mainland during more severe storm events. At such times, residents are warned to evacuate.

2.3.4.2 Flood Insurance Claims

Two property owners within this segment have filed more than one flood insurance claim: one on Douglas Circle and another on Harbor Lane at Barlow Lane; these represent 2% of repeat claims in the City.

2.3.4.3 Flooding Problems

Floodwater ponds along several roadways in Greenhaven during severe storm events (10-year and lower frequency). Areas affected include upper and lower Brevoort Lane, Norman Place, Rye Road and Greenhaven Road. During the 1992 storm, access to Lake Road from Greenhaven Road to Norman Place was cut off.

2.3.4.4 Infrastructure Problems

During the 10-year and lower frequency storms, facilities in the low-lying areas, particularly along the brooks and coasts, experience backflow in sanitary sewers.

2.3.4.5 Critical Facilities

The City operates a sewage pump station at Brevoort Lane 600 feet south of the Rye Road intersection; no flood-related problems have occurred at this facility.

2.3.4.6 Flood Control/Stormwater Management Facilities

There are no flood control or stormwater management facilities in this segment.

2.3.4.7 Coastal Character/Significant Natural Resources

The shoreline along the Marshlands Conservancy is intertidal marsh and mud flats. The shoreline at Greenhaven consists of high marsh that has been modified considerably for residential lawn and landscaping. The entire periphery of Hen Island supports mudflats that are bordered by intertidal marsh and high marsh habitats in the more interior parts of the island. The smaller uninhabited Crane Island is intertidal marsh. All of these wetlands are protected by State law.

2.3.4.8 Development Trends in the Floodplain and Natural Resource Areas

Further development of the Westchester County's Marshlands Conservancy is unlikely. The Greenhaven community is completely built; however, infill may occur if larger lots are subdivided further. Additional construction within the floodplain is unlikely. Hen Island is privately held and not likely to be further developed due to lack of electricity, sewerage and water.

3.0 Flood Mitigation Goals

As early as 1963 when it revised its 1945 Development Plan, the City of Rye began to address flood control by adopting goals and policies promoting sensible floodplain development through land acquisition. In 1963, the City strengthened that commitment and began to acquire floodplain and

flood prone lands along Beaver Swamp and Blind brooks, constructed the Bowman Avenue dam and reservoir, and dredged portions of Blind Brook. Two years later, the City began to participate in major stormwater planning studies and programs, including the US Army Corps of Engineers Floodplain Information Report for Blind Brook and portions of Beaver Swamp Brook (1965), the emergency phase of the National Flood Insurance Program (1975), and the USDA Public Law 83-566 Small Watershed Protection Program for Blind Brook (1976). In 1978, the City adopted floodplain zoning that exceeded the Federal Insurance Administration guidelines, qualifying it for full coverage under the National Flood Insurance Program. In 1984, the City joined its neighboring communities, the Town of Harrison and Village of Mamaroneck, to work with the County Soil and Water Conservation District to prepare a comprehensive stormwater management model and plan for the Beaver Swamp Brook watershed; the City also shared in the cost of watershed improvements recommended by that plan.

In its 1985 Development Plan, the City restated its commitment to flood control by adopting a policy preventing construction in the floodway and discouraging development in the 100-year floodplain. This policy has been implemented by updating existing ordinances and passing new regulations to mitigate flooding.[38] The City has encouraged individual property owners to retrofit their structures to protect against floods, and has continued to acquire floodplain land. It has supported a public works improvement program to replace storm sewers as needed and has worked with the County to improve community sewers.

The City continues its commitment to flood control and mitigation through non-regulatory cooperative programs in the update of its 1985 Development Plan, and as a Project Impact Community. As part of the update process, the City has canvassed municipal boards and citizen groups for input on existing and future flood control goals and policies. And as part of Project Impact, the City has created a Flood Control Subcommittee of the Project Steering Committee to provide a public component to this planning process. The City also has retained a consultant to prepare the Project Impact Technical Study to develop comprehensive floodplain mapping and identify stormwater management strategies for both the Blind Brook and Beaver Swamp Brook watersheds. The results of this study will provide specific recommendations and feasibility guidance for flood control and water quality enhancement of the City's surface waters. The following flood mitigation goals and action plan are therefore broadly sketched and will be modified on completion of the Project Impact Technical Study.

3.1 Flood Reduction Goals

The following flood hazard reduction goals are drawn from past flood control studies, the existing Development Plan, the Development Plan Update process and public comments, and the Project Impact Technical Study scope of work. The City has established a preference for non-structural controls over structural measures, and for incentive-based initiatives over regulatory programs. Where structural options are indicated, environmental and secondary impacts will be seriously considered and non-structural alternatives will be preferred. No new regulatory programs are identified.

[38] See History of Flood Control Initiatives, pp. 5-9.

3.1.1 Non-structural Goals

3.1.1.1 Planning and Zoning

a. Minimize risks to people and damage to property due to flooding in the Blind Brook and Beaver Swamp Brook watersheds and coastal sub-basins by participating in available federal and state flood control programs.

b. Minimize flood risk by participating in, and initiating or renewing where appropriate, intermunicipal watershed planning efforts.

c. Promote stewardship of Blind Brook and Beaver Swamp Brook by enlisting homeowner cooperation in attaining floodplain management goals, establish a public recognition program to reward participation and provide access to structural modification information and stream bank restoration planning and expertise.

d. Establish a Brook-keeper for Beaver Swamp and Blind brooks to educate the public, monitor riparian activities, and foster stewardship of the resource.

e. Continue to update and modify City codes and plans as necessary to prevent increased flooding and provide stormwater treatment.

f. Assign a higher priority to floodplain and coastal zone management, erosion control, and wetland protection in land use decision-making so as to encourage disaster-resistant development.

g. Ensure that new construction and redevelopment do not worsen existing drainage problems or flooding, within the City or downstream.

h. Pursue a cross-acceptance/approval program between the City and the school district, the County of Westchester, and other institutional property owners for land development activities that affect flooding.

i. Develop and maintain adequate floodplain information to use in flood prevention planning, to implement local regulations, and to inform the public about flood risks. Much of this data is being developed as part of the Project Impact technical study.

j. Develop new, and use existing geographic information systems databases to inform and improve flood protection planning.

k. Pursue a flood mitigation land acquisition program that targets parcels critical to flood control and maximizes the related goals of passive recreation and environmental protection.

l. Acquire where possible, through purchase or donation, easements to prevent floodplain encroachment and preserve and restore riparian buffers.[39]

m. Participate in federal, state and county programs to restore riparian corridors and stabilize stream channels.

n. Participate in federal, state and county stream gauging programs to reestablish and expand stream flow and rainfall records for City and regional watercourses.

o. Work to reduce flood insurance rates Citywide by addressing repetitive flood losses and implementing flood mitigation projects identified in this plan and on completion of the Project Impact technical study.

3.1.1.2 Drainage System Maintenance

a. Maintain, or provide for maintenance of all streams, drainage channels, and stormwater management structures (private and public).

b. Develop new, and use existing geographic information systems databases to enhance drainage system maintenance.

3.1.1.3 Natural Resources Protection

a. Preserve and restore freshwater and tidal wetlands and riparian areas to the maximum extent practicable for the flood protection and water quality benefits they provide.

3.1.1.4 Emergency Services

a. Lobby for, and participate in regional flood gauging programs to restore early flood warning capabilities to the city and surrounding communities.

b. Participate in federal and state flood control programs to enhance community emergency response planning.

c. Develop and use geographic information systems databases to enhance emergency response planning.

d. Maintain and regularly update the City's storm emergency response plan.

3.1.2 Structural Goals

3.1.2.1 Property Protection

a. By updating the flood insurance rate maps for the City, identify at-risk structures within the floodplain and develop an incentive-based mitigation program to reduce their vulnerability to flood damage.

[39] Conservation easements may be purchased at fair market value or accepted as donations. Agencies and organizations that purchase easements at fair market value are not required to comply with IRS regulations, but their criteria for acceptance should be similar to those for donated easements since their programs must still result in a public benefit. In some cases, fee acquisition can be as, or more cost effective than easement acquisition.

b. Educate and encourage property owners within the floodplain to prevent flood damage by modifying and/or relocating at-risk structures.

c. Evaluate and assess the effectiveness of current coastal erosion control practices to identify additional measures, if any, necessary to reduce or prevent damage to public shoreline and private properties.

d. Develop geographic information databases of floodplain data to assist property owners in determining vulnerability to flood loss and identifying possible structural modifications.

3.1.2.2 Stormwater Facilities and Capital Improvements

a. Pursue federal and other grant monies for capital improvements at the City's Bowman Dam facility in Rye Brook.

b. Participate in federal and state studies to identify feasible regional flood control facilities for the Blind Brook and Beaver Swamp Brook watersheds.

c. Assess City-owned properties and structures for structural flood control opportunities or improvements.

d. Identify and make road and bridge improvements recommended in the Project Impact Technical Study and supported by environmental studies to mitigate flood impacts along Blind Brook and Beaver Swamp Brook.

3.1.3 Public Information

a. Inform the public of known flooding problems and flood-prone areas.

b. Educate the public about the federal flood insurance program and emergency response plans.

4.0 Action Plan

The Action Plan is organized to correspond to the goals identified in Section 3.1 and presents non-structural and structural tasks, and public information elements. Non-structural activities are grouped into four categories (planning and zoning, drainage system maintenance, natural resources protection, and emergency services); structural activities are grouped under property protection and stormwater facilities. Public Information activities are presented separately. The watershed area(s) that will benefit from an action are noted in the text and presented in Table 1. It is important to note that Table 1 briefly summarizes each task; the reader should refer to this section for more detail on a specific task.

The City Flood Mitigation Plan targets non-structural and incentive-based options. Based on the findings of past watershed-wide flood control studies of both Blind and Beaver Swamp brooks, the City does not expect the Project Impact Technical Study to yield significant structural flood control alternatives other than modifications at the Bowman Dam site. As a result, the Action Plan allows for structural modifications of affected properties through incentive-based programs and relies heavily on non-structural controls, many of which are currently in place but can be strengthened. The City will emphasize non-regulatory incentives to flood mitigation over regulatory approaches.

Thirty-seven tasks are identified in the Action Plan and each is assigned a priority ranking 1 through 3. Task 1, completion of the Project Impact Technical Study, is the City's highest priority since this study will yield updated floodplain mapping and the technical database needed to define future flood mitigation projects. Level 2 includes tasks that implement the findings of the Technical Study, and position the City to reduce repetitive property losses due to flooding and thereby reduce flood insurance rates within the community; this level includes tasks 2, 3, 4, 5, 6, 7, 11, 12, 15, 18, 19, 22-28, 30-33, and 35-37. Level 3 includes tasks that support levels 1 and 2 but are not immediately necessary to implementation; these include tasks 8, 9, 10, 13, 14,16, 17, 20, 21, 29 and 34. The order in which tasks are implemented within each level will depend on grant opportunities and funding availability.

4.1 Non-structural Controls

4.1.1 Planning and Zoning Actions

Task 1 The City will participate in the Federal Emergency Management Agency Project Impact program by securing additional funding to complete its Technical Study begun in 1999. The products of that study, to be completed by 2003, will include the following:

- updated flood insurance rate maps and floodway information for the City;
- benchmark grid survey of the City;
- survey and geographic information systems (GIS) database of properties that suffer repetitive flood losses based on information provided by FEMA;
- survey and GIS database of the lowest openings of habitable structures within the floodplain;
- survey and GIS database of the lowest members of all bridges within the City;
- survey and GIS database of all State Pollution Discharge Elimination Systems (SPDES) outfalls within the City;
- survey and GIS database of all freshwater and tidal wetlands in the City;
- feasibility study of modifications of the Bowman Avenue Dam site to expand its flood storage capability;
- inventory of sites with flood mitigation potential; and a
- wind damage assessment.

Task 2 The City will update its Flood Mitigation Plan on completion of the Project Impact Technical Study to incorporate the findings and recommendations.

Task 3 The City will analyze the updated flood insurance rate maps maps from the Project Impact Technical Study to identify floodplain properties and will evaluate the adequacy of existing controls to protect them. The City will pursue opportunities to

reduce repetitive losses within its watersheds through regional projects and an incentive-based program for homeowner retrofits and/or modifications.

Task 4 The City will pursue federal, state and local grant funding for flood mitigation projects based on this Flood Mitigation Plan and the results of the Project Impact Technical Study.

Task 5 The City will evaluate its open space inventory for adequacy in relation to riparian zones, coastal areas, and floodplains and floodprone areas; based on the results of the Project Impact Technical Study, the City will work to acquire additional properties and easements with direct or indirect flood control benefits, particularly if such properties also serve other Development Plan and watershed goals, such as water quality improvement, habitat restoration, passive recreation, and environmental protection.

Task 6 The City will work through the intermunicipal Beaver Swamp Brook Working Group to cost-share flood mitigation improvements in that watershed in accordance with the results of the Project Impact Technical Study.

Task 7 The City will work through the County Watershed Advisory Committee program to establish an intermunicipal work group for Blind Brook to maximize cost-sharing opportunities to achieve flood mitigation and related watershed objectives identified in the Project Impact Technical Study and the WAC 3 Report.

Task 8 The City will establish a homeowner outreach program to promote cooperative stewardship of the floodplain by developing a public recognition program and providing technical assistance for structural retrofits, stream bank stabilization and related stewardship activities.

Task 9 The City consider establishing a Brook-keeper for Beaver Swamp and Blind brooks to educate the public, monitor floodplain activities and encourage stewardship of the resource.

Task 10 The City will finalize and adopt an updated Development Plan that includes a new chapter on flooding, outlining specific commitments for control and mitigation.

Task 11 Working with the Flood Control Subcommittee of Project Impact, City staff will review existing planning and zoning instruments to strengthen the priority given to floodplain, coastal zone management, erosion control, and wetland values in land use decisions; this review will target the following City codes:

- Chapter 100 (Floodplain Management)
- Chapter 195 (Wetlands and Watercourses)
- Chapter 173 (Surface Water, Erosion and Sediment Control)
- Chapter 197-7 (Site Development)
- Chapter 92 (Filling and Dredging)
- Chapter 170 (Subdivision of Land)

- Chapter 87 (Environmental Quality Review).

Task 12 The City will evaluate and modify as appropriate the 1991 LWRP policies that govern potential uses of shoreline club properties to strengthen disaster-prevention goals.

Task 13 The City will assess enforcement of existing codes and ordinances to ensure proper siting and management practices for new development.

Task 14 The City will work to establish a cross-acceptance/approval program with property owners and institutions not subject to local zoning, including the Rye City School District and Westchester County, for land development actions that affect flooding.

Task 15 The City will work with the Federal Emergency Management Agency to meet its community rating standards by implementing flood mitigation projects to reduce repetitive flood losses so as to reduce flood insurance rates throughout the City.

Watershed Areas Benefited by Tasks 1-15: All.

4.1.2 Drainage System Maintenance

Task 16 On completion of the Project Impact Technical Study, the City will update its maintenance plan for all streams, drainage channels, and stormwater management structures (private and public). This plan will specify parties responsible for regularly scheduled inspection and maintenance.

Task 17 The City will maintain geographic information systems databases developed for Project Impact, specifically SPDES outfall mapping and lowest bridge member surveys, for implementing and amending the drainage maintenance plan.

Task 18 The City will continue to conduct an Annual Inspection of the stormwater sewer system to identify and implement needed repairs to increase flood protection.

Task 19 The City will undertake dredging at bridge crossings where identified by the Project Impact Technical Study as necessary to reduce flooding, so long as such dredging can be demonstrated to be environmentally benign or beneficial.

Watershed Areas Benefited by Tasks 16-19: All.

4.1.3 Natural Resources Protection

Task 20 The City will review its surface water, erosion and sediment control law (Chapter 173) and its wetland and watercourses law (Chapter 195) to determine adequacy to prevent flooding and protect natural resources that mitigate flood impacts.

Task 21 The City will consider working with the County Department of Planning and Watershed Advisory Committee 3 to secure projects and funds for water quality and quantity management. The City will seek grant assistance for stream stabilization projects to address bank erosion along Blind Brook, Beaver Swamp Brook, and the coast, particularly in areas identified by the County nonpoint source program. The City

will use vegetative planting approaches wherever practicable to simultaneously protect water quality and restore riparian habitat.

Task 22 The City will seek grant assistance to acquire properties for wetland restoration and flood mitigation as identified by the Project Impact Technical Study.

Watershed Areas Benefited by Tasks 20-22: All.

4.1.4 Emergency Services

Task 23 The City will work with Westchester County and the US Geological Survey to reactivate the automated early flood warning gauging system installed throughout the county in 1982. At minimum, the City will seek to reactivate the Blind Brook and Beaver Swamp Brook gauges at General Foods and Short Street, respectively. At the time the gauges were deactivated, all hardware installations were left in place;[40] the county estimates that $3000-5000 would be required to re-commission each gauge currently sited.

Task 24 The City will use the GIS databases and other baseline information generated by the Project Impact Technical Study to expand its emergency response planning under Project Impact.

Task 25 The City will revise its Storm Emergency Plan in accordance with the findings and recommendations of the Project Impact Technical Study when completed. This will include reviewing incident command practices and the integration and coordination of existing response plans.

Task 26 The City will analyze the response capabilities of the County Hazardous Materials Spill Response Team and will seek intermunicipal cooperation to improve this regional service by reducing response times. The City will review its methods for communicating with the public regarding spills and will make improvements.

Watershed Areas Benefited by Tasks 23-26: All.

4.2 Structural Controls

4.2.1 Property Protection

Task 27 The City will update its Building Practices and Code, Preparing Structures for a Storm, to include guidelines on construction methods and simple projects that prevent wind and rain damage. Homeowners will be encouraged to comply with the upgraded standards, and the City will examine all public buildings for compliance.

Task 28 Using information available through FEMA, the City will assist individual property owners in identifying ways to prevent flood damages by undertaking structural

[40] A second, non-USGS gauge installed by the Beaver Swamp Brook Watershed Advisory Committee was completely dismantled and removed.

modifications and/or relocating vulnerable facilities to non-flood locations (e.g., boilers, electrical units etc.).

Task 29 The City will evaluate coastal erosion practices and options to identify additional measures, if any, that can further prevent damage to public shorelines and private properties. Implementation of such measures will depend on compliance with policies 11 through 17 of the City's LWRP and availability of funding.

Task 30 The City will use and make available to the public GIS databases developed by the Project Impact Technical Study to facilitate homeowner identification of flood risk and potential solutions.

Watershed Areas Benefited by Tasks 27-30: Floodplain properties in all watersheds.

4.2.2 Stormwater Facilities and Capital Improvements

Task 31 Using the information developed as part of the Project Impact Technical Study, the City will seek grant assistance to expand the stormwater storage capabilities of its Bowman Avenue Dam site in Rye Brook, incorporating water quality objectives where feasible and appropriate. If technically and environmentally feasible and affordable, the City will reconstruct the dam.

Watershed Areas Benefited by Task 31: Upper Blind Brook, primarily Indian Village and the Central Business District.

Task 32 Based on the findings of the Project Impact Technical Study, the City will assess the benefit of constructing regional detention facilities and related structures within its boundaries.

Task 33 The City will work with the county and state to ensure that scheduled bridge reconstructions incorporate design changes that the Project Impact Technical Study identify as necessary to reduce flooding.

Watershed Areas Benefited by Tasks 31-33: All.

4.3 Public Information

Task 34 The City will make available to the public updated floodplain mapping and related information from the Project Impact Technical Study. This information will be accessible at the City Planning and Building Department and will be available to ARCInfo users on the City web site.

Task 35 The City will research, write and publish a guide for disaster preparation and planning for local residents and businesses. The guide will include safety instructions in the event of various types of disasters and directions for response and evacuation. The guide will be distributed to all city residents and businesses and promoted through the City cable television station, web site, schools and other community outlets.

Task 36 The City is developing a Project Impact web site; at the conclusion of the planning phase of Project Impact, this site will serve as the City emergency preparedness/ disaster response information center. The City also will establish and maintain a resource center for Project Impact and flood mitigation at the Rye Free Reading Room and similar public outlets.

Task 37 The City will handle public information requests during routine City office hours by the Planning and Building departments.

Watershed Areas Benefited by Tasks 34-37: All.

TABLE 1. Summary of Action Plan by Task (page 1 of 4)

Non-structural Controls: Planning and Zoning

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
1. Complete Project Impact Technical Study	City Staff with Harza Associates	Estimated 2003	FEMA Project Impact; City funds; Federal Clean Water grant; NYS grants	All **Priority Level 1**
2. Update Flood Mitigation Plan to incorporate Technical Study findings	City Staff and **Council** with appropriate City commissions and boards	2003-2004	City funds	All **Priority Level 2**
3. Identify floodplain properties and assess mitigation opportunities	City staff with property owners	2003-2004	None	All **Priority Level 2**
4. Pursue grant funding for flood mitigation projects	City staff with consultant	Ongoing	City funds	Dependent on grant award **Priority Level 2**
5. Open space assessment and acquisition plan for floodplain properties	City staff and Council with appropriate City commissions and boards	2004	Grant funding for acquisitions with City funds	Dependent on location of acquisitions **Priority Level 2**
6. Work with Beaver Swamp Brook Intermunicipal Group to implement flood mitigation	City staff and appropriate City commissions and boards	Ongoing	Federal, State and Local funds	Beaver Swamp Brook watershed **Priority Level 2**
7. Work with WAC 3 to mitigate flooding on Blind Brook	City staff with appropriate City commissions and boards and WAC 3 members	Ongoing	Federal, State and Local funds as available	Properties within the Blind Brook Watershed **Priority Level 2**
8. Establish homeowner out-reach program	City Staff	2003-Ongoing	City	All floodplain property owners **Priority Level 3**

9. Consider establishing Brook-keeper	City Staff with appropriate City commissions and boards	2002	City and/or grant programs as available	All **Priority Level 3**
10. Update and adopt revised Development Plan	City staff and Council, with Planning Commission and Development Plan Update Committee	2003	None	All **Priority Level 3**
11. Review City codes for flood control modifications	City staff with appropriate City commissions, boards and committees	2003-04	None	All **Priority Level 2**
12. Evaluate shoreline club properties zoning	City staff with appropriate City commissions, boards and committees	2003-2004	None	Coastal shore areas **Priority Level 2**
13. Assess enforcement of codes, ordinances and construction practices	City staff with appropriate City commissions and boards	Ongoing	None	All **Priority Level 3**
14. Establish cross-acceptance program with schools, County and similar institutions	City Staff and Council with appropriate commission(s) and board(s)	Ongoing	None	Primarily Blind Brook floodplain **Priority Level 3**
15. Meet FEMA community rating standards to lower flood insurance rates	City staff and Council with appropriate commission(s) and board(s)	Estimated 2003	None	All floodplain properties **Priority Level 2**

Non-structural Controls: Drainage System Maintenance

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
16. Update and implement stream maintenance plan on completion of Project Impact technical study	City staff with appropriate City commissions and boards	2003-2004	None	All **Priority Level 3**
17. Amend drainage maintenance plan to include SPDES outfall and lowest member survey data from Project Impact	City staff	2003-2004	None	All **Priority Level 3**
18. Inspect and maintain storm sewers	City staff	Ongoing	City and federal mitigation funds	All **Priority Level 2**
19. Dredge bridge crossings	City staff	2002-2003	City and flood mitigation funds	All **Priority Level 2**

Non-structural Controls: Natural Resources Protection

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
20. Review surface water, erosion and sediment control and wetland and watercourses laws	City staff and Flood Control Subcommittee, with comment from the WCSWCD	Ongoing	None	All **Priority Level 3**
21. Seek grant assistance to implement stream stabilization	City staff and Council with appropriate City commissions and boards, and with WAC 3 as appropriate	Ongoing	City funds and grants	All **Priority Level 3**

22. Seek grants for property acquisitions for wetland res-toration and flood mitigation	City staff and Council with appropriate City commissions and boards	Ongoing	None	Areas identified by Project Impact Technical Study **Priority Level 2**

Non-structural Controls: Emergency Services

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
23. Reactivate early flood warning system	City staff working with Westchester County and US Geological Survey	2003-2004	City funds and grant aid to reactivate the gauges; maintenance contract with USGS needed	All **Priority Level 2**
24. Expand emergency response planning w/ Project Impact data	City staff with appropriate City commissions and boards	Ongoing	None	All **Priority Level 2**
25. Update storm emergency plan	City staff with appropriate City commissions and boards	Ongoing	None	All **Priority Level 2**
26. Analyze County Haz Mat Team response	City staff with Westchester Co. Department of Health	2003	None	All **Priority Level 2**

Structural Controls: Property Protection

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
27. Update City Building and Practices code	City staff with appropriate City commissions and boards	Ongoing	None	All **Priority Level 2**
28. Floodprone property mitigation assistance	City staff with property owners	Ongoing	Flood Hazard Mitigation funds	Dependent on location of property **Priority Level 2**

29. Evaluate coastal erosion options under City LWRP	City staff with appropriate City commissions and boards	2003	City, grant and private funding	Coastal erosion hazard areas **Priority Level 3**
30.GIS database development to assist homeowner identification of flood risk	City staff with consultant and appropriate City commissions and boards	Estimated 2004	City and grant funding	All **Priority Level 2**

Structural Controls: Stormwater Facilities

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
31. Bowman Avenue Dam improvements	City staff with appropriate City commissions and boards	Estimated 2003, on completion of Project Impact Technical Study	Flood Hazard Mitigation funds	Upper Blind Brook including Indian Village and the Central Business District **Priority Level 2**
32. Regional detention options assessment	City staff with appropriate City commissions and boards	2003-2004	City and grant funding	All **Priority Level 2**
33. Bridge reconstruction input	City staff with Westchester County (DPW) and New York State (DOT)	Ongoing	None	Dependent on bridge location **Priority Level 2**

Public Information

Task	Responsible Parties	Timing	Financing	Watershed Area Benefited/ Priority
34. Public access to updated floodplain maps and data	City staff	Estimated 2003, on completion of Project Impact Technical Study	City funds and grants	All **Priority Level 3**
35. Public Guide for disaster preparedness	City staff	2000-2001	City funds and Flood Mitigation grants	All **Priority Level 2**

36. Develop Disaster Response web site	City staff	Ongoing	City funds and Project Impact	All **Priority Level 2**
37. Routine public information on flood prevention, control and insurance	City staff	Ongoing	None	All **Priority Level 2**

Appendices

Appendix A

Project Impact Steering Committee

City of Rye
City of Rye Fire Department
City of Rye Police Department
City of Rye Board of Architectural Review
City of Rye Conservation Commission/Advisory Council
City of Rye Planning Commission
City of Rye Traffic Transportation Committee
American Red Cross
Bell Atlantic Mobile
Chase Manhattan Bank
Consolidated Edison Company
Harrigan Insurance
Harvey's Office Supplies Inc.
IAG Federal Credit Union
League of Women Voters
Local Community Leader, Mr. Jeremiah McGuire, Jr.
Local Community Leader, Mr. Joseph Brendel
Local Community Leader, Mr. Joseph P. Cox
Local Community Leader, Mr. William H. Ball
Local Community Leader, Ms. Adrienne Mecca
Local Community Leader, Ms. Dotty Battel
Mill Pond Marina
NY American Water Co.
NYS Industries for the Disabled
Playland Amusement Park
Port Chester-Rye-Rye Brook Volunteer Ambulance Corps
Rye Board of Education
Rye City School District
Rye Country Day School
Rye Hospital Center
Rye Neck School District
Rye Record Newspaper
Rye Town Park
Rye Volunteer Fire Department
Rye YMCA
The Gateside Corporation
The Osborn Home
United Hospital Center
Westchester County Emergency Management